## modern machine shop

HOW TO CUT PRODUCTION COSTS

See Page 98

MACHINING SCREW THREADS FASTER

See Page 120

JANUARY 1959

PRECISION SAWING WITH THE INCOMPARABLE

LENOX BAND SAW BLADES





AMERICAN SAW & MFG. COMPANY

SPRINGFIELD, MASSACHUSETTS . U.S.A.

## ADAMAS 548 CHALLENGES YOUR PRESENT STEEL CUTTING GRADE!

A unique balance of key metallurgical properties ... this is the difference between Adamas 548 and other steel cutting carbide grades. Let 548's metallurgical superiority prove itself on your next steel cutting job. Take your first step toward optimum carbide performance today . . .

(Specific Grade 548 physicals relating to hardness, density, and transverse rupture strength plus microphoto of grain structure available upon request.)

a throwaway style and size from the form below. Complete the form and request your Purchasing Department to mail it to Adamas. No invoice will be sent to you for 30 days. During this 30 day period . . .

the package of ten Grade 548 inserts you receive against your present steel cutting grade.

for yourself the performance of your 548 inserts. If for any reason you feel 548 did not outperform your present steel cutting grade, simply return all used and unused inserts and your order will be automatically cancelled . . . at no charge to you!

SEND FOR YOUR 548 PACKAGE TODAY!

- - CUT OUT AND MAIL - -

## ADAMAS CARBIDE CORPORATION DEPT. 472, KENILWORTH, NEW JERSEY

Please enter my order for 10 pieces (one package) of Grade 548 inserts...style and size as checked. If at the end of 30 days, for any reason I am not satisfied with their performance I will return all used and unused inserts and tay order will be automatically cancelled... at no charge.

TRIANGULAR PRECISION-GROUND	BLANK ORDER NO.	1.C.	A.	Т	R	PRICE	CHECK
NEGATIVE RAKE	TB-12P22	3/8		1/8	1/32	-	
700,7	TB-12P32	3/8		3/16	1/32	AS F	
	TB-12P33	3/8		3/16	3/64	PER	
A +: > 1	TB-16P32	1/2		3/16	1/32	CUI	
- " -	TB-16P33	1/2		3/16	3/64	CURRENT	
SQUARE [	SQ-16P22		1/2	1/8	1/32		
PRECISION-GROUND	SQ-16P32		1/2	3/16	1/32	ADAMAS	
NEGATIVE RAKE	SQ-16P33		1/2	3/16	3/64		
T	SQ-24P32		3/4	3/16	1/32	CAT	
	SQ-24P33		3/4	3/16	3/64	CATALOG	
- A -	SQ-24P34		3/4	3/16	1/16	0	

I would like a style (or size) other than listed above.

Please send me:.....

NAME\_\_\_\_\_\_TITLE\_\_\_\_\_
COMPANY\_\_\_\_\_
STREET\_\_\_\_\_\_
CITY\_\_\_\_\_STATE\_\_\_\_\_



## **GRADE 548** is specifically recommended for machining:

LIGHT TO MEDIUM CUTS LIGHT INTERRUPTED CUTS Tough Alloy Steels:

3000	300	Stainless
4000	400	Stainless
5000	Tool	Steels
6000	Mon	el
52100	inco	nel
8600	Nitra	aloy



ADAMA

CARBIDE CORPORATI

KENILWORTH, N J

KENILWORTH, N J
Producers of Tungsten
Carbide Tools, Tool Tip
Dies, Wear Parts,
Dex-A-Tool.

M. L RICH FREE ROBI L. L. M. C GILB ALFR NORA

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## modern machine shop

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## features in

Assembling & Finishing... Inspecting, Testing & Control...
Press Working... Management & Safe Practices... Materials & Processes... Production Machining... Tooling & Despin

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## NUCLEAR LABORATORY PERMITS LOOK INTO THE FUTURE

## By Bartlett West

Nuclear Metals' new \$2,000,000 highly functional laboratory in Concord, Massachusetts, has latest facilities for working on virtually every existing metal in the development of new materials for the Nuclear-Space Age.

Page 94

## PACE—AN EFFECTIVE COST REDUCTION TOOL FOR MANAGEMENT

## By Gilbert C. Close

A major break through in the long-time effort to reduce production costs in non-automated shops and industries has been effectively accomplished by an industrial engineering program called PACE (Performance and Cost Evaluation) inaugurated by and placed in operation at Northrop Aircraft, Inc., Hawthorne, California.

Page 98

## HOW MODERN FACILITIES PROVIDE FOR APPARATUS PRODUCTION

## By Fred W. Vogel

Discussion explains how Westinghouse's new Bloomington, Indiana, plant is equipped to produce products used in the distribution of electric power, such as power capacitors, lightning arresters, fuse cutouts, oil circuit reclosers and switches, coupling capacitors, and line traps.



Page 112

## this issue

JANUARY 1959 . VOL. 31 . NO. 8

## ATTACHMENT HELPS TO PRODUCE THREADS FASTER

This report from Europe points out how a Germanmade lathe attachment reduces time requirements to about one-tenth that normally required in cutting threads on screws.

Page 120

## PRACTICAL POINTERS FOR PROFITABLE HEAT TREATING

## By A. S. Eves

The third installment of a series of articles on heat treating procedures, the present discussion provides helpful tips for tempering or drawing steel, covering such topics as steel composition and strength; drawing temperatures; equipment for tempering; time; and discoloration.

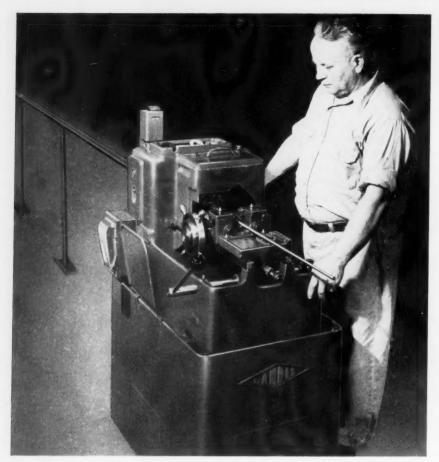


Page 122

## MORE PRODUCTION THROUGH MODERNIZATION

Featured this month in our regular department devoted to discussing techniques for increasing output with newly developed machines and tools is an article pointing out the value of using proper clamping tools in setting up a job on a machine tool. Other articles in this section explain how a speed lathe is used to prepare aluminum samples for analysis; discuss a method for the honing of cylinder bores to close tolerances; and describe an efficient setup for the multiple machining of brake drum castings.

Page 134



## THREADING AT 581 R.P.M.

Suburban Industries, Bensenville, III., is achieving these results with a LAND-MACO 5C Threading Machine equipped with a 5/8" VVV LANCO Hardened and Ground Die Head. Both steel studs and continuously-threaded bars are produced at 581 r.p.m.

Chaser life is excellent. For example: 10,000 study of B 1113 steel, having a 1/2" UN thread 3/4" in length, are produced between chaser grinds. In the rod

application, with 1/2" 13 pitch UN threads in 12-foot lengths, 150 bars of B 1113 steel are produced between chaser grinds.

The 5C LANDMACO Machine is manufactured in a single-spindle model for threading all diameters from 3/16" to 5/8" to Class 4 fit. Lead screw and airoperated equipment available to increase machine efficiency.

519

## LANDIS Machine COMPANY

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operation with Hammon FLAT FINISHERS
For fast, uniform, economical finishing of flat work such as sheets, bors.

For fast, uniform, economical finishing of flat work such as sheets, bars, strips, stampings and extrusions with one machine, one operator and one pass.

AUTOMATIC AIR TENSIONING: maintains correct tension on abrasive

belts and conveyor belt • VARIABLE SPEED CONVEYOR: rate of feed is adjustable from 0 to 60 FPM • WORK HOLDERS: hold-down rolls, electro-magnetic platen and various types of conveyor belts • AMMETER CONTROL: an ammeter for each head allows operator to determine and maintain the polishing pressure necessary for a uniform finish and longer belt life • V-BELT DRIVE: allows abrasive belt speed to be changed to suit the work • MICROMETER DIAL: controls heads for required depth of cut.



SEND SAMPLES
SEND SAMPLES
Send your finished and sereral groups of the serence of

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1615 DOUGLAS AVE. . KALAMAZOO, MICHIGAN

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## 94 ELECTRIC CLUTCH HAND TURRET LATHE

- MORE PRODUCTION
- MORE ACCURATE WORK
- FINER FINISH AND
- LOWER COST

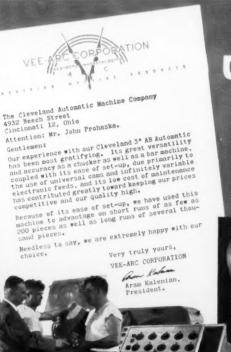


## THE WADE TOOL CO.

WALTHAM 54

MASS.

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Aram Kalenian, writer of the letter reproduced above, and president of Vee-Arc Corp., is shown with Ralph Rastad, superintendent, and Paul Daoust, operator, examining a chucking job run on their 3" Model AB Cleveland Dialmatic.

## WHAT THE CLEVELAND DIALMATIC DOES FOR VEE-ARC... IT GAN DO FOR YOU!



The parts shown (some are blanked out, others are machined complete) are typical of those produced on the Model AB 3" Cleveland Single Spindle Automatic at the Vee-Arc Corp. Diameters of these parts range from ½" to 4½", and materials include aluminum, type 303 stainless, and tough, cold hobbing steel.

By making use of the Cleveland's chucking attachment, which is quickly substituted for the bar stock feed assembly, the part shown at right is machined from blanks of  $4\frac{1}{4}$ " round aluminum bar stock in 98 seconds cycle time.

What the Cleveland Dialmatic does for Vee-Arc, it can do for you! Choose Clevelands to increase the production efficiency in your plant.

## THE CLEVELAND AUTOMATIC MACHINE COMPANY

4946 Beech Street Cincinnati 12, Ohio

SALES OFFICES: CHICAGO CLEVELAND . DETROIT HARTFORD . S. ORANGE

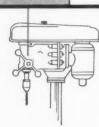
Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

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January, 1959

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## Like to know more about it?



These two free booklets tell the entire story. Write for them today. Address: Dept. MMS159, The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

There are more hand fed drill presses in use than any other machine tool. They are all pretty much alike. The operator positions the work in a jig or fixture, feeds the drill in and out of the work by hand.

It's a tiring job. Towards the end of the shift both quality and quantity suffer.

Let's put a Bellows Drill Press Feed on the star wheel shaft. Now, the operator touches a lever. Automatically the drill is fed in and out of the work, under perfect control. Production is increased 20%-30%; quality is better; tool life longer.

Let's go a step farther. Add a Bellows Rotary Feed Table. Now all the operator has to do is load parts. The table automatically positions the part under the drill, the drill press feed automatically feeds the tool, the table indexes to eject one part and position another. Production is more than doubled, often more than tripled.

## The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION

MANUFACTURERS OF CONTROLLED-AIR-POWER DEVICES FOR FASTER, SAFER, BETTER AND LOWER-COST PRODUCTION

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7678-1

## Multiple tooling

cuts at BOTH
450
and
113
s. f. p. m.

How V-R Carbide
and TANTUNG cast alloy
gang up to solve cutting problems

PROBLEM: How to bore 2" I.D. at 113 SFPM while turning 8" O.D. at 450 SFPM.

SOLUTION: A V-R toolholder and throw away insert will perform perfectly on the 450 SFPM O.D. but the 113 SFPM boring speed demands the cutting qualities of V-R TANTUNG cast alloy. TANTUNG is especially engineered for speeds between carbide and High Speed Steel.

V-R Carbide and TANTUNG make a perfect tooling team to solve this and many other cutting problems. Ask your V-R Representative or write for complete information. V-R Engineers will be glad to work with you on all of your cutting problems.



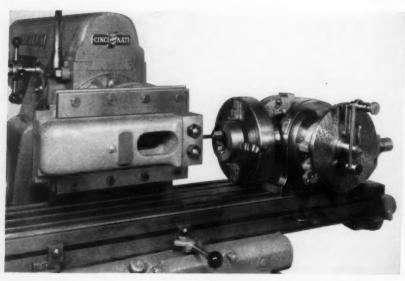


PRIME MANUFACTURERS OF REFRACTORY METALS ENGINEERED FOR THE JOB

832 MARKET ST. . WAUKEGAN, ILLINOIS

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## ...it adds SLOTTING to variety of



Shaping the serrations in a die blank

## **BRIEF SPECIFICATIONS:**

## Slotting Attachment

Swivel range of tool slide ..... 360°

Length of stroke..... 0 to 4"

Strokes per min. . . . . . . . . . . . same as machine spindle speed

Set of slotting tools . . . . . . . included Catalog No. . . . . . . . . . . . . . . . M-919-1

## CINCINNATI® KNEE TYPE MILLING MACHINES - BED TYPE MILLING MACHINES

HE SINKIN

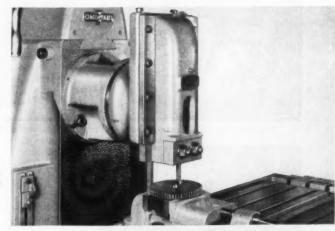
## AND SHAPING operations performed CINCINNATI Milling Machine

A minor machining operation, like slotting, becomes a major concern when it holds up production. You can prevent an occurrence of this type by equipping your CINCINNATI Milling Machines with Cincinnati Slotting Attachments. Through a simple adjustable crank arrangement, the rotating motion of the machine spindle becomes a reciprocating motion for the attachment. ¶Cincinnati Milling makes a wide variety of attach-

ments to increase the range of work which may be assigned to their milling machines. Some are for toolroom setups (Precision Measuring Equipment) while others are for high production setups (Index Bases). Brief data for all Cincinnati Milling Attachments will be found in Sweet's Machine Tool File. Circular M-919-1 contains complete details on Cincinnati Milling's Slotting Attachment. Write for a copy.



Slotting the keyway in the bore of a gear



HE SINKING MACHINES . CUTTER AND TOOL GRINDERS

MILLING MACHINE DIVISION
The Cincinnati Milling Machine Co.
Cincinnati 9, Ohio

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January, 1959

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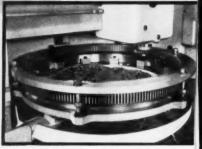
## rellows GEAR SHAPERS cut INTERNAL Gears



3" Fine-Pitch Gear Shaper cutting internal gear.



No. 10 Rotary Gear Shaper cutting internal helical.



36-Type Gear Shaper with special work-holding fixture.

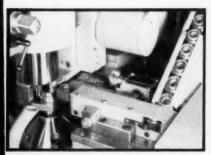


120" Gear Shaper cutting light tank turret gear.



as

## as EASILY as Externals



4GS Gear Shaper with full-automatic operation.

rs

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7A-Type Gear Shaper with fast-action diaphragm chuck.

Not only internal gears, but splines, clutches and an almost unlimited variety of other internal shapes can be produced on versatile Fellows Gear Shapers just as simply, rapidly and economically as external shapes. In many cases, the same Gear Shaper cutter can be used to cut both internal gears and their mating pinions.

Set-ups and change-overs are simple and fast on any Gear Shaper from the 3-Inch Fine-Pitch to the 120-Inch. Rigid construction makes it possible to hold close tolerances at high production rates. On some models, full or semi-automatic operation is available whenever the size and shape of the work and the production requirements make it practical.

Your Fellows Representative can give you full information about the production benefits of Fellows gear shapers, shaving machines, grinding machines, inspection instruments, or cutting tools. Just contact the nearest Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

FELLOWS Gear Production Equipment

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January, 1959

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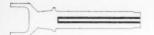


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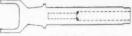
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1. Solid bore-feed 53/4" per minute.



2. Counter bore-feed 8" per minute.



3. Form radius-feed 53/4" per minute.



4. Reverse part, solid bore—feed 5% per minute. 5. Form radius—feed 5% per minute.



6. Part finished accurate to ± .001° on length and concentricity, 25 to 30 microinches on finish! Part is forging, length 14½°, 4130 steel, Rockwell 39 to 43-C.



## This horizontal pin machined 8 TIMES FASTER... on the Rapid Borer

Formerly, this aircraft part was rough drilled, reamed, radius formed, ground and honed. Operation called for turret lathe, grinder and honing machine. Even with experienced operators, incidence of spoilage was high because of precision requirements.

On the LeBlond-Carlstedt Rapid Borer, there is only one set-up. Part is completed, *finish bored* in 5 simple operations. Cycling is automatic. Workpiece spoilage is down. Operation is so simple that unskilled operators are quickly trained. Currently 2 different sizes are being produced in lots of 300 to 400.

LeBlond-Carlstedt Rapid Borers will solid bore, trepan or counterbore holes 3 to 8 times faster than by the conventional D-bit method! Hole capacity from  $\frac{6}{16}$ " to  $\frac{4}{4}$ " diameter. Handles symmetrical work—round, square, octagonal, tapered or stepped—wide variety of hole diameters and depths, work sizes. Available in three sizes, No. 15, No. 30 and No. 60.

Tell us about the holes you'd like to produce faster. Large holes or small. If the Rapid Borer can handle the job, you'll produce them faster than ever before. Write for Bulletin LC 501 E.

### LeBlond customer:

Peter J. Salmon Co., Glenside, Pa. Contract machining, specialists in high precision work. Semi-production machining, drilling, honing.

According to Peter J. Salmon, Owner, "No machinery investment we've ever made has reduced our immediate costs as dramatically as the LeBlond-Carlstedt Rapid Borer. Actually, it competes cost-wise with any other holemaking method for holes as shallow as one inch. On longer holes there's no comparison! Not with the Rapid Borer, which can feed over 30° per minute!"

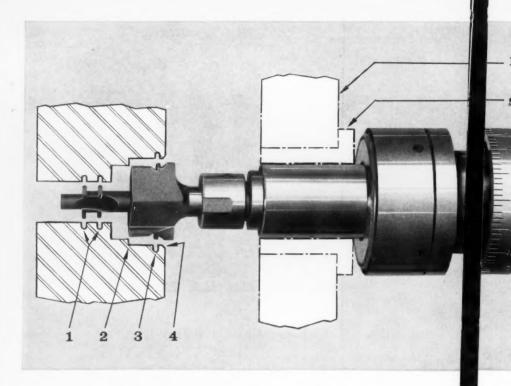
## THE R. K. LeBLOND MACHINE TOOL COMPANY

Cincinnati 8, Ohio



World's Largest Builder of a Complete Line of Lathes for more than 71 years

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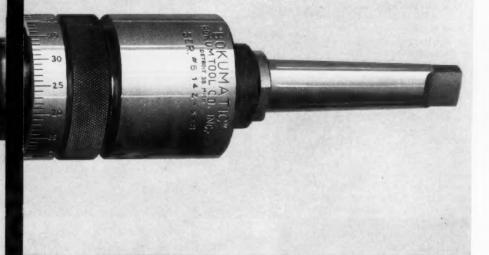
## 4 OPERATIONS ...1 PASS

Here is a typical job that Bokum solved with the Bokumatic Recess Tool Holder. The holder was piloted in a 1-1/4" bronze bushing plate for concentricity and completed the following operations in one plunge cut:

- 1. Two oil grooves-3/4" diameter.
- 2. Facing operation-1-3/8" diameter.
- 3. Beveled retaining ring groove-1-3/8" diameter.
- 4. Chamfer edge of part-1-3/8" diameter.

## BUSHING PLATE FIXTURE

STD. 1-1/4" DIA. BRONZE BUSHING



All of the above operations had various depths of cut from .060 to .096 per side. The job was done quickly with the Bokumatic holder and Bokum-designed special tools.

The customer took full advantage of the quick change adapter. Once the tool holder and the adapter were set, there was no need for the set up man to reset the job after each regrind of the tool. Tool set-up was done in the grinding room. You, too, can take advantage of the Bokumatic holder with Bokum special designed internal forming tools, or with Bokum standard "O" ring, retaining ring, back chamfering, and thread recessing tools. Write today for more information.



BOKUM TOOL CO. INC.

14775 Wildemere Ave., Detroit 38, Michigan

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GENTERLESS

PRECISION LAPPER

An accurate and simple finishing operation for lapping worn gages to a smaller size — for lapping any cylindrical part requiring fine finish and close tolerance. Eliminates ring lapping. No special tooling is required. Any diameter from .010" to 6" may be lapped. Adjustable roll speeds.

model 200 (Pat. No. 2465178) complete with 2 sets of rolls ground for precision work—1 set for roughing—1 set for finishing; vibrationless drive; 1 only ½ h.p. motor, AC, 220/440 volt, 3 phase, installed; 1 cabinet; 1 set of 3 lapping sticks; 1 jar lapping compound; 1 set of instructions.

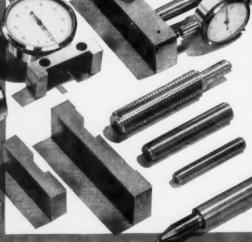
complete and ready to

model 100—complete with 1 set of rolls for roughing and finishing. Large roll 6" x 53" diameter, small roll 6" x 3" diameter. Other specifications same as for model 200. Complete \$850.00



Finish Lap Your Cylindrical Parts With SIZE CONTROL CENTERLESS LAPPER





## SIZE CONTROL COMPANY

2500 West Washington Boulevard
CHICAGO 12, ILL. • MOnroe 6-6710

## SPECIAL GAGES

Size Control is equipped to supply special gages in limited or production quantities. Gages can be made to customer's specifications—or recommendations made without obligation. Illustrated is a small selection of flush pin, special snap gages, concentricity and depth plugs, flat gages, ring gages and profile gages made by this department.

## HOW TO CUT SET-UP TIME WITH Sundstrand Magnetic Chucks

Here are two more examples of the profitable application of Sundstrand magnetic chucks to grinding operations. Similar, profitable applications have been made to milling jobs.

No matter how you are holding work pieces now, in grinding and milling, talk to a Sundstrand engineer. There is no obligation for this service.

## SET-UP TIME CUT 30%

12"x96" transverse pole magnetic table on vertical spindle grinder holds various sizes of H.S.S. broaching tools at an average savings in set-up time of 30% over former method.



## SET-UP TIME CUT 20%

Four 10"x40" POWER-GRIP Chucks on a 24"x96" horizontal spindle surface grinder hold ways, way caps, valve plates, broach holders etc. The four chucks can be operated individually or as one complete unit. Set-up time averages 20% less than previous method.



## GET MORE FACTS

Write for further information on holding work for both grinding and milling operations.

BULLETIN 599-M



## SUNDSTRAND-American BROACH

DIVISION OF SUNDSTRAND MACHINE TOOL CO.

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January, 1959

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We happen to know it is-on this specific job!

But frequently operators will rely on "pet cutters" for milling a variety of parts and materials. Result: Either higher costs or inferior finish . . . and usually both.

The problem has always been to match the cutter exactly to work and machine on every job.

Solutions to problems like these are our main product. And only after a penetrating study of machine, work, depth of cut, speed, feed rates and finish requirements do we recommend any cutter.

The inserted blade cutter pictured above is an example. On the work and the machine for which it was designed it is "the one best cutter for low cost milling."

We would welcome the opportunity to tell you more about this unique

cutter selection service. Write:



This helpful new booklet tells you how to reduce the cost of chips and improve your milling and boring performance. Ask for a free copy of booklet No. 68.

**CUTTER DIVISION** 

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CIRCLE R Deep-Cutting saws for slitting and cut off enable heavier feeding due to curled chip disposal action, gain longer life through efficient tooth design. And in the making, our special methods achieve superiority that shows up in your performance records. We make a superior saw, then heat treat with exclusive techniques and equipment. Circle R Heat Treating perfects our products with scientific precision - to better your production.

Consult these CIRCLE R Specialists . . .

MILWAUKEE Ford Tool Co.

BURBANK INDIANAPOLIS CHICAGO CLEVELAND Production Tool Co.

MONTREAL DAYTON J. R. Kuntz Company DETROIT NEW YORK CITY J. S. Cremenin (Expert) HACKENSACK PHILADELPHIA

PHOENIX DiEugenia Tool Center PITTSBURGH Rolah Espasite & Com PROVIDENCE fred J. McMillen ROCHESTER SY. LOUIS B. C. MacDonald B Co. WESTBURY, L. I.

PROVIDENCE 5, RHODE ISLAND
Specialists in Circular Cutting Tools Since 1923



METAL SLITTING SAWS . COPPER SLITTING SAWS . SCREW SLOTTING SAWS . COMMUTATOR SLOTTING SAWS . JEWELERS' SLOTTING SAWS . CUT OFF SAWS . CIRCULAR KNIVES & ROTARY SHEAR BLADES . CIRCOLOY STEEL SAWS . SOLID & TIPPED TUNGSTEN CARBIDE SAWS . COMBINED DRILLS & COUNTERSINKS . CENTER REAMERS

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January, 1959

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## BEST GRIP # BUSINESS-



All Popular Sizes Carried in Stock for Immediate Delivery!

Sutton Collets run true and hold true! The famous "Diamond Grip" serrations attack horizontal and rotating thrusts at an angle—work is gripped tighter, spoilage is reduced, life of chucking mechanism is prolonged under a reduced tension.

## **Uniform Temper and Tension**

Sutton's modern and exclusive heat treat method localizes controlled heat to give uniform spring temper on all collets and uniform tension on all feeders—provides added life to the collet and feeder.



22

Write for Catalog 22

26 pages complete with valuable collet and feeder information. Sent Free! SUTTON # COLLETS

FEEDERS and TOOLS Sutton Tool Co., Dept. MMS1, Sturgls, Mich. Suttons Run as True as the Spindle

For more data circle 323 on Postpaid Card



Insert bar stock between Locking Pin and Radius Pin of desired size. Clamp tube. Insert Follow Block between material and Forming Roller.

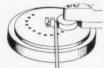


OFF CENTER EYES HOW TO BEND bars and

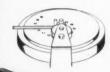
tubing



Advance Operating Arm until it strikes Angle Stop.



Set Forming Roller against material and advance Operating Arm.



Complete operation with one steady movement.

Remove Follow Block, release clamp and remove tube.





## DI-ACRO BENDER

Complete details on forming rods and tubing with standard accessories as well as tips and technical data on angle, channel and other materials will be found in "It's pronounced die-ack-ro easy to bend", a 32 page summary of Di-Acro Benders and bending. A copy is yours free of charge.



Consult the yellow pages of your phone book under Machinery— Machine Tools for the name of your nearest Di-Acre distributor for Quick Facts Folder describing this and other Di-Acre Machines.

## O'NEIL-IRWIN MFG. CO.

306 8th Ave.

Lake City, Minn.



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**DIFFERENT** motorized and Belt Driven

## SPINDLES

one of which may be just the one to LOWER YOUR PRODUCTION COST

Here are only a few representative Pope Precision Spindles:



## FOR SURFACE GRINDING

POPE 1, 2 and 3 HP Totally Enclosed 1800 and 3000 RPM Motor-Ized, Cartridge Type Spindles with double row cylindrical roller bearings of enormous capacity for superior performance and long life, plus separate thrust bearings for no endwise movement of the shaft.



### FOR HEAVY DUTY MILLING AND GRINDING

POPE % to 100 HP Direct
Motorized Spindles
Operate in any position
— flanged or tapered
noses — equipped
with super-precision,
double-row roller
bearings and preloaded
ball thrust bearings.
Top quality performance is assured on skin
milling, grinding, boring and other operations as well as milling.

## FOR TOOL AND CUTTER

POPE Super-Precision 1 HP, 3600 RPM Motorized Tool and Cutter Grinder Clearance Angle Swivelling Heads

Swivelling Heads provide angular adjustment in a vertical plane. They pay for themselves in time saved. Cup wheels can be used for practically all clearance angles.



### FOR BORING ROUND HOLES WITHIN MILLIONTHS OF AN INCH

POPE Heavy Duty Boring Spindles assure smooth, chatter free, continuous high production of accurate parts. Belt driven or motorized, in a wide range of horsepowers and speeds.



### FOR INTERNAL GRINDING

POPE Precision Internal Grinding Spindles have the super-precision bearings to withstand both axial and radial loads and to produce better finished ground holes. Their ability to take heavy cuts means increased production. Wheel life is increased, too. For Bryant, Cincinnati, Excello, Heald, Landis and Norton Grinders.

### FOR HIGH CYCLE GRINDING AND MILLING POPE Super-Precision, High Frequency, Heavy Duty

Spindles are available for speeds up to 100,000 RPM. They are unequalled for low cost maintenance, long life, trouble-free operation and rugged ability to cut metal fast.

Send us your specifications and get prompt quotations on the one best Spindle for you out of the 20,000 different Precision Spindles that bear the name "POPE."

No. 116

ROPE

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Heavy Duty Vertical Milling Attachment

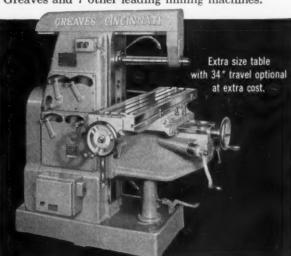
## Heavy duty attachments increase versatility of dependable, low-cost

## GREAVES MILLS

"THE MOST MILL FOR THE LEAST MONEY"

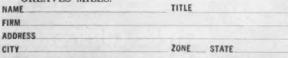
A full line of attachments and accessories offer outstanding flexibility for all types of milling operations . . . with GREAVES MILLS.

Make your own comparison of 22 specifications of Greaves and 7 other leading milling machines.



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Send Comparison Chart, I will make my own comparison
of GREAVES MILLS with other makes.
Send information on Attachments and Accessories for
GREAVES MILLS.







Heavy Duty Offset Vertical Milling Attachment



Universal Milling Attachment



Toolmakers Overarm

Send coupon for FREE Comparison Chart and detailed descriptive literature on easy-to-use attachments.



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26

## NEW LOW COST LEAD SCREW TAPPER



operating control

- Produces Gauge Perfect Parts
- Eliminates parts spoilage, inspection
- · Saves Taps, Reduces Fixture Costs
- · Fast, Economical, 6-way Operation

Here is truly the most accurate, most precise, cost-cutting tapper on the market! New, different, flexible, it can be operated with push button and foot control for cycle or jog, automatic or with switch in fixture for full cycle. Either way, it provides a uniformity, speed and precision accuracy that's unparalleled!

Here are just a few features: · uniform threads in any pitch from

- 20 to 96. · positive depth stop.
- · depth stop holds uniform depth to within .005"
- · tap capacity O" to 3/4" in steel.
- · lead screw travel 13/6".
- · "safety return" stops tapping instantly.

## Easy to Operate - Pays for Itself!

Push button releases electrically controlled air pressure engaging sensitive friction clutch which actuates lead screw. The tap, completely controlled by lead screw, is fed gently, automatically without pressure. The result is repetitive uniformity and precision that never varies! Tests proved all tapped parts passed 100% inspection

## ocun

### Send for FREE Brochure

giving the full story of this amazing new tapping unit. See how you can enjoy higher quality tapping, less tap breakage, parts spoilage and increase tapping efficiency-for less cost! Write today!

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PROCUNIER SAFETY CHUCK CO., Dept. 1 12 S. Clinton St., Chicago, III.

Genlemen: Please rush me your FREE brochure on the new Lead Screw Tapping Attachment.

ADDRESS

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January, 1959

modern machine shop



- T-SHAPED BLADE . . . provides liberal side clearance that eliminates excessive friction.
- HOLLOW-GROUND TOP . . .
   causes chips to collapse thus relieving friction against sidewall of cut.
- COOLER OPERATION . . .
   collapsed chips are drawn away from sidewalls permitting coolant to reach blade cutting edges.

In addition, you get blades that are precision ground on all surfaces—complete blade interchangeability—centrality of head to shank held to close tolerances—sharper cutting edges—resharpening on front face only—smoother cut-off surfaces.



The standard cut-off blade of all leading Machine Tool Manufacturers.

Standard holders available for any machine using cut-off blades.

Made under license issued by John Milton Luers Patents, Inc.

11503 Lambs Road

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Memphis, MICHIGAN

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modern machine shop January, 1959

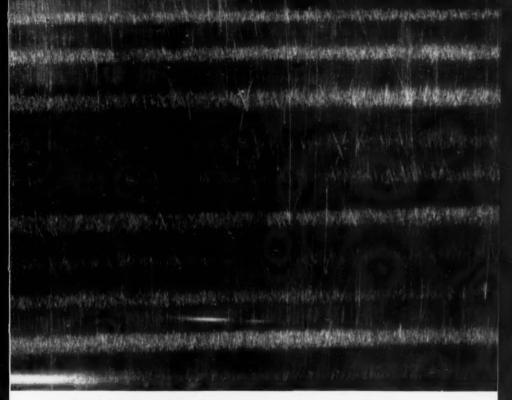
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ASK YO



## This roll looked perfect... until SUPERFINISH revealed these defects!

Everybody said it was as perfect a finish as you'd ever see. A 12" steel roll ground down to a smoothness of less than 2 micro inches—dazzlingly reflective from end to end. Not a visible defect—on the surface.

But when SUPERFINISHING began, some interesting marks appeared—longitudinal flat spots—defects produced by the prior operation and then covered up by the heat of grinding.

SUPERFINISH brings these hidden troubles out in the open out where you can see them and recognize the cause. And if your troubles are not too serious, SUPERFINISH can correct them economically and fast.



GISHOLT MACHINE COMPANY

If you have fine finish requirements it will pay you to write for our new Superfinish Catalog.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY-REBUILT MACHINES WITH NEW MACHINE GUARANTEE

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Man-au-trol turret heads are gang-planed

## single point tools

The makers of OK single point tools originated the world's first system of inserted tool bits, preground, ready to use.

OK single point tools with their interchangeable tool bits were revolutionary when introduced to American industry 50 years ago.

Today they are universally used on lathes, shapers, planers and boring mills,

size 20 x 20 x 12" and weighing 1000 are anchord with a bill to the best of a big 48" Glodings are soon 35 hp Hypro planer. Two OK shankless flat-nose tools with high speed steel tool bits cut an

h high speed steel tool bits cut an 80° angle on four sides, making a flat pyramid. Chips are heavy 1/16° depth, 3/4° wide. Feed, 40 ft/m.

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For the second operation, the blocks are swiveled around and a rugged intermittent cut is made. Carbide could not stand the shock of such a powerful impact. When dull, tool bits are switched, right to left, doubling to life of the bit and continuing production with the minimum of downtime.

OK tools are built for heavy machining.
Holders are tough forgings. For tool bits, you have a choice of high speed steel, coba<sup>16</sup>,
Vasco Supreme and carbide.

Write for OK Tool Catalogs

TWO COMPONENTS-



modern milling cutters
for modern milling machines
THE OK TOOL CO., INC., Millord, New Hampshire

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January, 1959

## 3 ways

ALKER- URNER

"Light-Heavyweight"

## Drill Presses can cut your production costs

You can't beat these famous Walker-Turner "Light-Heavyweights" for fast, accurate, low-cost drill press operation. Available in 15" and 20" floor, bench and single or multiple-spindle production models, with 4½" or 6" spindle travel. Also available as components for building your own automated production machinery. For details, see your W-T distributor (listed under "Tools" in the yellow pages of your phone book).



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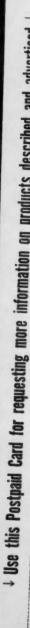


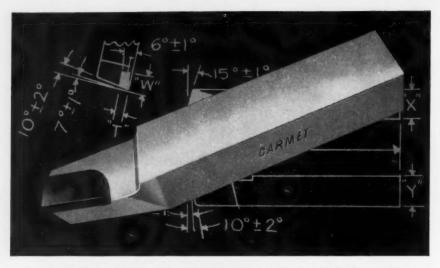
2. As multiple drilling lines



3 As low-cost automated machines (with W-T components)

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-on short or long runs!

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Full guidance in selecting the proper grade, assistance in selecting the proper tool, is available locally from your Carmet Distributor. He stocks a full line, is there to serve you. Call on him or the Carmet Service Engineers whenever they can help. Carmet Division, Allegheny Ludlum Steel Corporation, Detroit 20, Michigan.

### FREE NEW CARMET CATALOG



This 32-page first edition contains prices and complete specifications on Carmet's full line of cemented carbide tipped tools, Indexable Inserts, blanks and holden: Speed and feed charts, grade comparisons and ordering information included

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... then machine at optimum feeds and speeds

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CA-4	Machining cast iron and nonferrous material. 300 series stainless.	C-2
CA-604	High Velocity finishing.	C-8
CA-605	Precision boring steel. Light, fast cuts.	C-8
CA-606	Light, fast machining on steel, stainless and high temp, alloys.	C-7
CA-608	Light to medium-heavy machining on steel.	C-7
CA-610	General machining on steel. Heavy roughing cuts.	C-6



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Full-time tooth engagement, plus all these features:

Interchangeable to 40 or 50 taper machines • quick change

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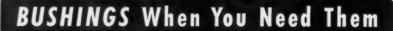


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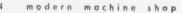
Precision made by highly skilled operators, you will find that these ACME bushings meet your highest requirements. We suggest that you try Acme for finest drill bushings.

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January, 1959

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Assures You
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to Meet Your
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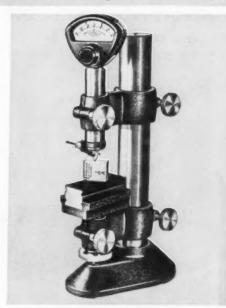
(for inside measurements .155 to 24 inches). Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.

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(Amplifier—for outside measurements) Graduations .0001 to .000001 or .01M to .0002M.

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Catalog Number	Scale Range Inches	Graduations Inches
510-E2	0".006	0".0001
510-E4	0".0024	0".00005
510-E5	0".0014	0".00002
510-E6	0".0008	0".00001
510-E7	0".0004	0".000005
510-E8	0".0002	0".000002
510-E9	0".00004	0".000001

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NEW "MULTIPACT" MULTIPLE HORIZONTAL MACHINES
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36 modern machine shop

January, 1959



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BIG CAPACITY • Up to 2" square solids, 3½" o. p. pipe and tubing, 3" angle iron, and 4" channels. Wheel oscillation, an exclusive feature in this price range, provides this above-average capacity.

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**QUALITY** • Clean, smooth cuts, even on large sections, because wheel oscillation provides cooler cutting.

**VERSATILITY** • Cuts cold rolled, stainless, and alloyed steel; cast iron; and non-ferrous metals.

**ECONOMY** • Occupies minimum floor space . . . eliminates annealing costs . . . gives more cuts per wheel as a result of oscillation.

SIMPLICITY • Just two SEVER-ALL cutting wheel specifications will do all your SEVER-ALL cutting jobs. Little or no set-up time required.

#### NEW SEVER-ALL AVAILABLE FROM DISTRIBUTORS

Very likely your own distributor already stocks the Model 1-A SEVER-ALL Abrasive Cutting Machine and Wheels. If not, we'll give you the name of your nearest SEVER-ALL distributor. We'll also be glad to send you complete details on this new machine. Just ask for Bulletin DH-106.

#### ALLISON-CAMPBELL DIVISION AMERICAN CHAIN & CABLE

931-S Connecticut Avenue, Bridgeport 2. Conn. For more data crcle 338 on Postpaid Card





#### Will PRODUCTION LAPPING Prove Beneficial in MY Plant?

Get The Answer With

#### YOUR OWN FREE ANALYSIS

THE Lapmaster SERVICE

It's easy to prove to yourself whether production lapping will benefit your own manufacturing process...improve your product performance. Just send a few sample parts with surface finish specifications and production requirements to the Lapmaster Technical Service.

We'll test run them in our experimental lapping laboratory and furnish you with a full production report. This complete special analysis will give everything you need to determine how profitable the Lapmaster will be in your plant. Lapped samples will enable you to positively check product improvement.

More than 80% of the successful Lapmaster installations now in daily operation started with just such an analysis . . . and in the majority of cases, the results have shown substantial savings. However, if the application is not practical or profitable for you, we are frank to report it.



TECHNICAL BULLETINS FOR YOU—If you want additional information immediately, write for these latest technical bulletins on producing and measuring precision flatness and finish.





View of our experimental lapping laboratory showing some of the equipment available to test run your sample



Our lapping laboratory is also equipped with the finest checking instruments to insure an accurate report of every experimental job.

#### WHAT YOU CAN EXPECT FROM A LAPMASTER

- Surface finishes of 2 to 3 RMS and surface flatness within tolerances of .0000116" with absolute uniformity piece after piece.
- No production bottlenecks frequently caused by other lapping methods.
- No downtime for truing lap plate . . . conditioning rings automatically keep plate flat and true.
- Product performance and quality improved . . . rejects cut to a minimum . . . inspection costs reduced.

Crane Packing Company, 6418 Oakton St., Morton Grove, III. (Chicago Suburb)



38















CRANE PACKING COMPANY

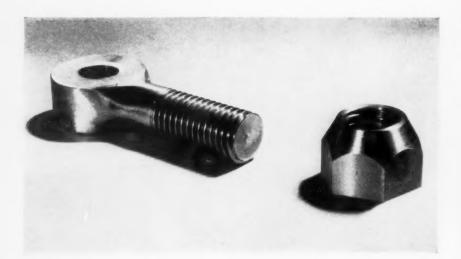
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ARMSTRONG-BLUM MFG. CO.

S700 BLOOMINGDALE AVE. - CHICAGO 39, ILL.

For more data circle 340 on Postpaid Card



# Change in stainless steel grade solves hardness problem, improves machinability, saves money

A large manufacturer of laundry equipment was making the nut (above) of free-machining Type 303 stainless steel. While this grade provided excellent machining characteristics, the part failed to meet the manufacturer's requirements for hardness. Armco engineers suggested changing to Armco Type 416 Stainless Steel, also free-machining.

Not only did this grade meet hardness requirements, but machining properties and surface quality were improved. Furthermore, the change in grades resulted

in substantial savings in cost.

Armco Free-Machining Stainless Steels are available through your nearby Armco Distributor. His salesmen are mill-trained to help you with grade selection. If your machining problem is especially tough, Armco engineers with years of experience in machining stainless steels will gladly assist in its solution.

If you don't know the name of the Armco Distributor nearest you, just write

Armco Steel Corporation, 1139 Curtis Street, Middletown, Ohio.

#### ARMCO STEEL



Armco Division • Sheffield Division • The National Supply Company Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

For more data circle 341 on Postpaid Card

#### REDUCE DRILLING COSTS... INCREASE HOLE ACCURACIES

# RGH

. . . with your own standard twist drills sharpened to SPIRAL POINT — Cincinnati's new drill point geometry.

Drill PRECISION holes with Spiral Point
—all the way up to 1" diameter.

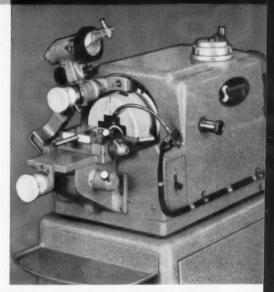
Get accurate hole size . . . straighter, rounder, cleaner holes . . . and you eliminate secondary operations. Maintain hole-positioning accuracy without costly guide bushings or precentering. Get more holes per grind.

#### CONVERT

the twist drills in your plant to precision Spiral Points with the new Cincinnati SPIROPOINT® DRILL SHARPENER. It automatically applies this cost-saving geometry in a matter of seconds.

#### IMMEDIATE DELIVERY

on sizes to 1"



Improved Machining Through Research



#### CINCINNATI LATHE AND TOOL CO.

3207 Disney Street . Cincinnati 9, Ohio

"TRAY-TOP" Lathes / "CINCINNATI" Drilling Machines / "SPIROPOINT" Drill Sharpeners

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#### HIGH SPEED PRECISION LATHE

Correct Size - High Speed - Precision Results



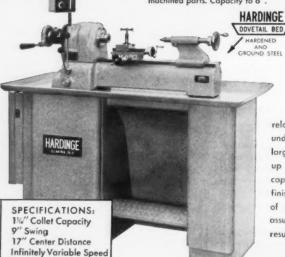
Collet Work — The right machine for collet work of 1-1/16" or less diameter.



Step Chuck Work — For rapid and accurate holding of tubing, castings, moldings, stampings and machined parts. Capacity to 6".



Jaw Chuck Work—Integral mount, universal or independent, for extra accuracy. Capacity to 5".



The above three important requirements for proper lathe work in tool rooms, production departments, or laboratories are completely fulfilled by the new Hardinge DV59 High Speed Precision Lathe.

Correct size of the machine in

relation to work saves loss from under-capacity production on larger lathes. High spindle speeds, up to 3500 r.p.m., permit full capacity cutting and excellent finish. Sustained accuracy and ease of operation

assure precision results.





HARDINGE BROTHERS, INC., ELMIRA, N. Y.
"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

OFFICES IN PRINCIPAL CITIES: Export Office: 269 Lafayette Street, New York 12, N. Y.
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230-3500 r.p.m.

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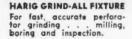
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Now! Equip your tool-room with the most accurate, dependable surface grinder available. Out-performs many similar makes costing far more. Made by grinding specialists to assure you of superior results—time after time!

- Solid one piece construction of spindle housing and verticle slide.
- · Elevating screw centrally mounted.
- Combination "V" and flat ways assure positive alignment.
- · Angular rack and pinion face.
- Motorized spindle, dust collector and water unit available.





NEW! RADIUS DRESSER ARM

Quickly converts Harig's Grind-All Fixture into a precision Radius Dresser. WRITE FOR LATEST BULLETIN

Harig Manufacturing Corp.

5765 W. HOWARD ST. . CHICAGO 31, ILL.

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# OA

9" column 3'-4' arms



9"-11" column 3'-4'-5' arms



13"-15"-17" column 4'-5'-6'-7' arms



19" column 6'-7'-8' arms



22"-26" column 7' to 12' arms

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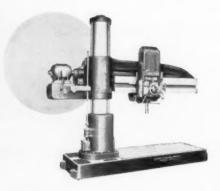
# Carlton

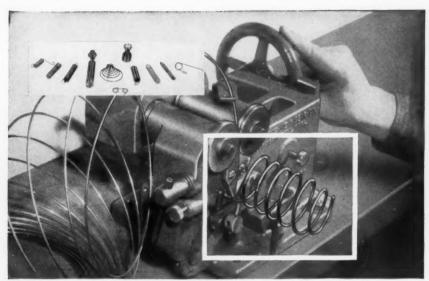
# specialists in radial drills

Carlton has specialized in radial drill research, engineering and manufacturing since 1916. Our close contact with—and intimate knowledge of industry's drilling requirements—have produced a wide line of the most modern and up to date radial drills. Made in arm lengths from 3-ft. to 12-ft., column diameters from 9" to 26". Programming, pre-select and manual speed-feed controls, plus special bases, tables, and jigs available for

additional productivity. For further information, send today for free descriptive bulletins.

The Carlton Machine Tool Co., Cincinnati 25, Ohio.





## Make any type spring . . . fast, exact!

For a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with Perkins Precision Spring Coiler. You eliminate arbors, yet turn out precision springs — torsion, compression, extension, tapered, or special springs, coiled either left or right hand, in any desired length, any diameter from 3/32" to 12" and larger, with or without initial tension, and with

open or closed ends. Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications as replacements or experimental work. Make them fast, right in your own shop!





Starrett adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

	Perkins Machine and Gear Co. Special Machinery Division, Dept. D1 W. Springfield, Mass. Please send information and prices on Perkins Spring Coiler. Hand Model  Power Model
	NameTitle
	Company
	Address
	CityState

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In checking with the tool, die, gage and general production shops that use SAN-FORD SURFACE GRIND-ERS, the most frequent comment was that Sanford Grinders were the "most used" of any grinders in the shop.

#### PARTIAL SPECIFICATIONS-

Capacity - 8" x 12" x 12".

Table travel - 13", traverse 83/4". Vertical clearance 12" under 7" wheel.

Standard grinding wheel - 7" x 1/2", 11/4" hole.

Spindle speed approx. 3000 RPM. Motor, 1/2 HP, single or 3 ph., dynamically balanced.

Floor space - 45" x 38" x 62" high. Net wt. with stand approx. 630 lbs,

Others have tried to copy but there's a "feel" that comes from the precise individual quality and workmanship that goes into every SANFORD GRINDER. It's the factor that can't be found in any other grinder.

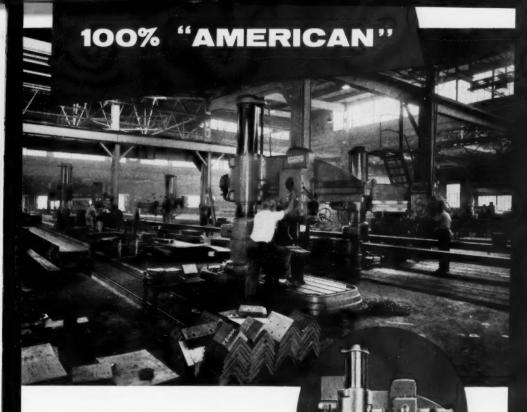
> So widely used you can ask users in your own area how they like the low priced Sanford Surface Grinder.

Write for illustrated and fully descriptive literature, reconditioning facilities, optional equipment and prices.

Representatives in major industrial areas

MANUFACTURING CORP. 1022 Commerce Ave., Union, N. J.

For more data circle 347 on Postpaid Card



The Stupp Bros. Bridge and Iron Company of St. Louis, Missouri, known the country over as one of the leading structural steel fabricators, use "AMERICAN" Radial Drills exclusively.

Mr. Erwin P. Stupp, President, gives as his reasons for his continuous selection of "AMERICAN"—

- EASE OF HANDLING
- RIGIDITY
- FAST MANIPULATION
- LOW MAINTENANCE

These factors combined with the extra power offered by "AMERICAN" Hole Wizard Radials guarantee a handsome return upon the user's investment.

The half dozen "AMERICAN" Radials installed during the past 10 years are conclusive testimony to the satisfactory service afforded by these modern drilling, boring and tapping machines.

#### PLUS FEATURES

- · Centralized Control.
- · Lightning-fast Direct Reading Speed Change.
- · Nitrided Spindle and Sleeve-practically wear proof.
- · Timken mounted column unit defies deflection.
- Raybestos covered, spring steel tapping attachment friction bands, quick acting, wear proof, permitting 40% speed-up for spindle reverse.

Send for bulletin No. 328

LATHES AND RADIAL DRILLS

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#### du MONT TOOL BITS can TAKE it because they're

BALANCED



- TOUGHNESS

- RED HARDNESS

- WEAR RESISTANCE

An almost perfect balance of these three important qualities enable duMont High Speed Tool Bits to take a keener cutting edge and hold it longer — to give you a bonus of cutting life in every bit.

Make your own tests — compare cost and performance. See why economy-minded buyers everywhere favor duMont H.S. Tool Bits.



The	du MONT	CORPORATION,	Greenfield,	Mass
1110	un mon i	OURI ORATION,	di communa,	111000

MAIL FREE Tool Bit COMPARISON CHART, CATALOG and PRICE LIST \$

Name.....

Address

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#### Meetings

Important Meeting
Dates

JANUARY 26-27 • American Society of Lubrication Engineers, Gear Symposium, Morrison Hotel, Chicago. Society headquarters: 84 E. Randolph St., Chicago 1, Illinois.

JANUARY 26-29 • Plant Maintenance and Engineering Show, Public Auditorium, Cleveland. Information: Clapp & Poliak, Inc., 341 Madison Ave., New York 17. New York.

JANUARY 26-29 • American Society of Heating and Air Conditioning Engineers, International Heating and Air Conditioning Exposition, Convention Hall, Philadelphia. Information: International Exposition Co., 480 Lexington Ave., New York 17, New York.

MARCH 9-10 • Steel Founders' Society of America, Annual Meeting, Drake Hotel, Chicago. Society headquarters: 606 Terminal Tower, Cleveland 13, Ohio.

MARCH 16-20 • American Society for Metals, Western Metal Exposition and Congress, Pan-Pacific Auditorium, Los Angeles. Society headquarters: 7301 Euclid Ave., Cleveland 3, Ohio.

APRIL 6-10 • American Welding Society, Annual Convention and Welding Show, Hotel Sherman and International Amphitheatre, Chicago. Society headquarters: 3 W. 39th St., New York 18, New York

APRIL 14-15 • Illinois Institute of Technology, Conference on Industrial Instrumentation and Control, Illinois Tech Campus, Chicago. Information: Frank Judd, Extension 2392, Illinois Institute Technology, 35 W. 3rd St., Technology Center, Chicago 16, Illinois.

APRIL 22-24 • Institute of Environmental Engineers, Annual Technical Meeting and Equipment Show, LaSalle Hotel, Chicago. Information: A. Billet, IEE, 1959 Meeting Chairman, c/o Vickers Inc., Detroit 32, Michigan.

# NOW'S THE TIME... HERE'S THE PLACE to find the tumbling abrasive you need

The big Norton Sample Processing Department solves your finishing problems with a wide variety of latest types of tumbling equipment — plus Norton ALUNDUM\* TUMBLEX\* abrasives, made in four different types and many different sizes.



One leading aircraft parts manufacturing company reports saving over \$90,000 yearly by shifting from hand-finishing to barrel finishing with Norton TUMBLEX abrasives.

There's one sure way for you, too, to get these cost-cutting, product-improving "Touch of Gold" advantages. Your metal parts can range from tiny needles to hefty forgings... may be simple or complicated, hard metals or soft... may require deburring, de-

scaling, better color and closer finish. Just send sample parts to our Sample Processing Department. They'll be returned to you completely finished to requirements, with a detailed report. Or, next time you're in our area, drop in and learn how your finishing can be improved.

NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

\*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

G-342



Making better products... to make your products better

#### NORTON PRODUCTS

Abrasives • Grinding Wheels
Grinding Machines • Refractories

BEHR-MANNING DIVISION

Coated Abrasives • Sharpening Stones
Pressure-Sensitive Tapes

For more data circle 350 on Postpaid Card

January, 1959

modern machine shop

49



For high production bending of pipe, tube, strip or shapes of bar stock. Up to 4,800 bends per hour—with no labor costs. Operation is 100% automatic.

The PEDRIMATIC is the first and only automatic rotary

head bending machine available. For specifications and cost figures write, describing intended application if possible. Pedrick Tool and Machine Co., 3640 N. Lawrence St., Philadelphia 40, Pa. Dept. 5.

# PEDRICK PRODUCTION BENDERS

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50



### Spark your way to easier, faster dressing with a NORBIDE Dressing Stick

With a NORBIDE Dressing Stick you can see more of the wheel for easier, faster dressing.

The stick causes the wheel to throw out sparks, light up your work. Reduced dressing dust keeps air clear. And the stick's convenient size doesn't obstruct your view. You see the wheel better — avoid costly overdressing.

NORBIDE Dressing Sticks outlast hundreds of ordinary sticks. Made of boron carbide, they approach diamonds in hardness — at a fraction of diamond cost.

Order one today or write for form 1567 giving more details.

NORTON COMPANY, 49 New Bond St., Worcester 6, Massachusetts.





W-1864

51

Making better products . . . to make your products better

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January, 1959

modern machine shop

# GREEN Pantograph Engravers

Keep the work in your own plant.



Famous 2 or 3-dimensional engraver, successfully used by thousands, features 5 positive, accurate pantograph ratios. Versatile ball bearing spindle has three speeds up to 14,000 rpm; height of pantograph and position of cutter are continuously adjustable; one copy carrier (supplied) accepts all standard master type sizes.

The Model 106 has proven incomparable for speed and accuracy . . . yet reasonably priced.

Cutter grinders, rotary tables, master letters, compound slides, name plates and all required accessories. For complete information, write to



- 575 pounds rigid, sturdy, precise
- Vertical adjustment of copy table automatic with Pantograph
- Unobstructed on three sides to take large work
- Micrometer adjustment for depth of cut
   Ball-bearing construction throughout
- super-precision ball bearing spindle
  Spindle speeds up to 26,000 rpm for engraving or machining modern
  - materials
    Ratios 2 to 1 to infinity
     master copy area
    26" x 10"
    - Vertical range over 10"



GREEN INSTRUMENT COMPANY, INC.

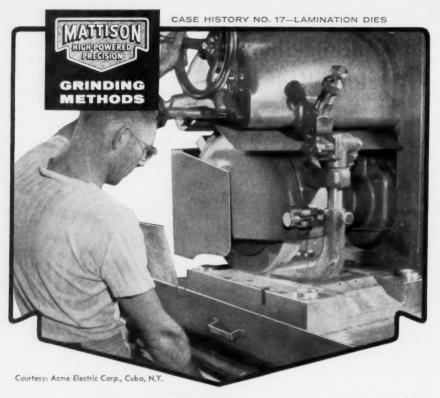
392 PUTNAM AVENUE, CAMBRIDGE 39, MASS.

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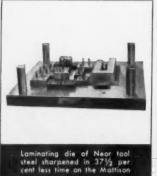
# For DEBURRING, CHAMFERING, RADIUSING, FITTING . . .

Master mechanics, tool and die makers always use INDIA and Hard ARKANSAS oilstone files for precision work. They hold their shape longer and won't dull. Send for FREE Hand Stoning Handbook — Dept. MS-1.





#### Cuts die sharpening time as much as 37 1/2% holding parallelism within .0002 in.



This manufacturer has reduced die sharpening time as much as 371/2 per cent with a new Mattison High-Powered, Precision Surface Grinder, holding parallelism within .0002 in.

The operator easily grinds the dies "dead flat" without touching the shoulders on either side. One die, which took four hours to sharpen on another machine, can now be finished in 21/2 hours on the Mattison.

On a Mattison Surface Grinder you can take "hogging" cuts and finish extra large surfaces fast.

Mattison Machine Works, Rockford, Illinois, U. S. A.



For more data circle 355 on Postpaid Card

modern machine shop

January, 1959

For more data on advertisement on opposite page, circle 356 on Postpaid CardROCKFORD MACHINE TOOL CO. 2500 KISHWAUKEE STREET ROCKFORD, ILLINDIS

SPEED and VERSATILITY

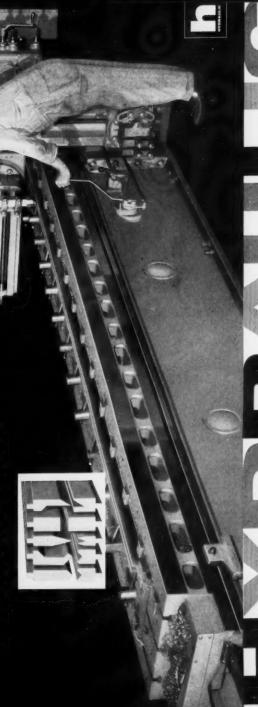
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Rockford Hy-Draulic Shaper-Planers

provide "Off-The-Shelf Delivery"

for

DREIS & KRUMP CHICAGO PRESS BRAKE DIES





The Anderson Hydraulic Hand Press was developed to *reduce costs*. Checking and straightening are accomplished in one position . . . eliminating the time consumed shifting parts back and forth from checking fixtures to straightening anvils. Efficient hand hydraulic pumps power various models of presses ranging in capacity from 10 to 50 tons. Attachments make possible the checking of stepped or odd shaped parts with centers. Different lengths of work can be handled by easy adjustment of rolls and centers. A pressure gauge is standard equipment. A special attachment is an indicator calibrated to thousands of an inch for locating high and low spots on the work, and to indicate how much the shaft is bent under pressure. An Anderson Hydraulic Hand Press can help you solve your straightening problems.



56

Write for Bulletin No. 1-22

ANDERSON BROS. MFG. CO. ROCKFORD, ILLINOIS

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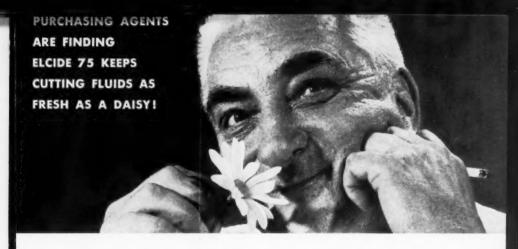
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# ELCIDE 75<sup>™</sup> extends the life of soluble oil emulsions

...lowers operating costs three ways

**Less oil concentrate** is purchased because standard duty emulsions last far longer when treated with one ounce of Elcide 75 per four gallons of emulsion.

Labor costs are reduced because less nonproductive time is spent recharging machinery. The labor costs of disposal also decrease because there is much less waste oil to be handled.

**Production increases** because machines are not shut down as often. Elcide 75 also contributes to better products and longer machine tool life by controlling the bacteria that may cause staining and corrosion. Employee efficiency improves, too, because Elcide 75 eliminates odor and controls bacteria that can cause skin infections.

Elcide 75 is more effective than other inhibitors because it is a combination of antibacterial agents, and includes a powerful new compound related to one of the safest, most effective bacterial inhibitors used in medical surgery.

Elcide 75 controls harmful bacteria...

This photomicrograph shows one type of bacteria that enters emulsions through the air, water, and plant debris. They multiply rapidly and cause odor, staining, corrosion, and emulsion breakdown. Their damage costs the metalworking industry thousands of dollars each year.



Elcide 75 specifications: Active ingredients—Sodium Ethylmercuri Thiosalicylate (Thimerosal) and Sodium o-phenylphenate. Price per gallon—1 gal. (4 per case), polyethylene, \$8.50; 5 gals., polyethylene, \$8.00; 55 gals., stainless steel, \$6.50. Sold only through selected distributors. For more information or to place your order, phone or write:



Lilly's brand of bacterial inhibitor for cutting fluids

ELI LILLY AND COMPANY-AGRICULTURAL AND INDUSTRIAL PRODUCTS DIVISION-INDIANAPOLIS 6, INDIANA-TELEPHONE: MELROSE 6-2211

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GENERAL PURPOSE



# United States Electrical Tools



PRECISION LATHE



VERTICAL SPINIDLE



TOOL POST

OVER 60 YEARS OF SERVICE TO INDUSTRY



#### **GRINDERS AND DRILLS**

Electrically and mechanically correct. All rotating parts and spindles are precision-balanced dynamically by latest electronic equipment.

Performance — plus remarkable savings in time and costs — as well as minimum maintenance — assure your satisfaction.

Precision-engineered and crafted for maximum endurance under exacting conditions . . . tools to speed production or for plant purposes.

Attractively priced.

WRITE FOR CATALOG

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

For more data circle 359 on Postpaid Card

# pick your pump from

Model PS4 1800 to 2600 rpm 31/2 to 5 gpm



Model AGM 1/4 to 1 hp sizes

#### INE CENTRIFUGAL COOLING PUMPS

. . . cool choice for dependable coolant delivery!

#### **FULFLO Direct-Connected**

- Can be arranged for belt drive
- Right or left rotation
- · Self-contained priming chamber
- · Automatic packing adjustment \* Hardened steel sleeve
- Pipe sizes \%" to 1\/2"

#### FULFLO Motor-Driven

- · Special motors with heavy duty ball bearings, totally-enclosed, splash-proof frames
- · Centrifugal action insures pumping regardless of chips or grit
- For practically any type of installation

Model KGTS4 1600 to 2400 rpm 12 to 16 gpm



Model FS4 1800 to 2400 rpm 35 gpm at 1800 rpm



Model 2ES4 1600 to 2400 rpm 10 to 30 gpm





Write for your copy of "FULFLO PUMPS MECHANICAL DATA BOOK" Model FMS Vertical and Horizontal 1/4 hp; 30 gpm flange mount



THE FULFLO SPECIALTIES CO., INC., 416 FANCY AVE.—BLANCHESTER, OHIO

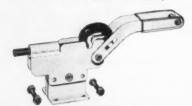
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#### 3 <u>NEW</u> KNU-VISE CLAMPS





P&P-1200 Hand Push-and-Pull Clamp



P&PSB-1200 Hand Push-and-Pull Swivel-Base Clamp



AOP&P-1209 Push-and-Pull Air-Operated Clamp

WRITE TODAY FOR COMPLETE INFORMATION

Push the handle! Pull the handle! It makes no difference—the new Knu-Vise clamps by Lapeer give you uniform clamping of parts. That's real performance! Look at these features—

90° handle motion produces lock of plunger for push or pull without resetting of handle. Handle is reversible. Plunger guided by two widely separated, hardened steel bushings for accuracy in motion and minimum wear. Built-in deflection provides uniformly tight clamping of parts with normal variation in thickness. Swivel base model provides 90° total change in direction of plunger motion. The air (or oil) operated model, AOP&P-1200, produces approximately 41/2 times the clamping force with 85 p.s.i. than the cylinder would alone. Failure of air (or oil) pressure does not permit reverse motion of plunger, thus not affecting clamping force.

All parts easily replaceable.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

#### KNU-VISE PRODUCTS

#### LAPEER MANUFACTURING CO.

3048 DAVISON ROAD

WESTERN DIV.: PECK and LEWIS CORPORATION 4436 Long Beach Ave., Los Angeles 58, Calif., ADams 3-7146 CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD. 1131 Pettit Road, Burlington, Ontario

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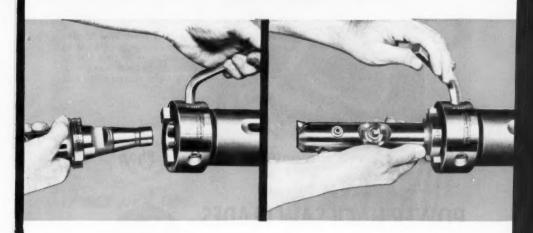
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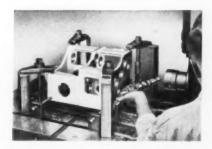
change tools in seconds! retain exact diameter settings ...



#### WITH MICROBORE FLASH-CHANGE SYSTEM!

Flash-Change permits a boring bar, set to a specific bore diameter, to be changed in seconds for other machining operations. Again and again, the bar can be quickly repositioned in the machine to accurately duplicate the original operation without further adjustment.

Flash-Change tooling includes a complete range of boring, drilling and milling equipment readily adaptable to any machine, or from one machine to another, by means of a simple Flash-Change Tool Holder with driving shank to suit the machine spindle. In addition to Flash-Change, the Microbore System includes a complete range of Standard Boring Bars. Special Cluster Bars can be furnished upon receipt of a part print and engineering data.



Shown is a cast iron gear box machined with Flash-Change tooling on a production basis. Production time substantially reduced. Bore diameters duplicated to extremely fine limits.

For complete information on a tool system that can greatly increase your production standards and profits, write for Catalog No. 57.

#### DEVLIEG MICROBORE SYSTEM

DE VLIEG MICROBORE . DIVISION OF DEVLIES MACHINE COMPANY

2720 West Fourteen Mile Rd., Royal Oak, Michigan

For more data circle 362 on Postpaid Card



Star Power Hack Saw Blades come in a wide assortment of types and sizes. Each is clearly labeled so you know you are using the right blade for the job.

**STAR** Performers in any Metal Cutting Shop

STAR
POWER HACK SAW BLADES
and BAND SAW BLADES

Cut metal cutting costs with famous STAR quality blades.

Because they are fabricated from the finest
alloyed, properly heat-treated steel, they last longer.

Teeth are formed by specially designed equipment
to insure top performance...fast, easy cutting.

Star Band Saw Blades are available in Outline, Skip Tooth and Gored-Tooth types for a variety of cutting jobs on ferrous and non-ferrous metals and plastics. Up to and including ½" size, they are packed in the handy new Reel-Pac Dispenser. It brings new convenience to handling and storing band saw blades. You simply draw out the amount you need, any excess withdrawn can be easily slipped back onto the reel. The sturdy, permanent plastic Reel-Pac holds 100 feet of blades. Other lengths and sizes as well as welded-to-length in conventional packages.





FREE TO YOU. An attractive and informative STAR METAL CUTTING WALL CHART to put up in your shop. Also, STAR METAL CUTTING GUIDEBOOK – fact-filled with valuable information about economical, efficient metal cutting.



#### STAR HACK SAW and BAND BLADES

Manufactured by

CLEMSON BROS., Inc. • Middletown, N. Y., U.S.A.

Makers of Hand and Power Hack Saw Blades, Frames, Metal and Wood Cutting Band Saw Blades and Clemson Lawn Machines

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... now your distributor can supply both

# Bunting CAST OR SINTERED BRONZE

#### Fast pick-up...

Stock sizes of Bunting Cast Bronze and Sintered Bronze Bearings and Bars are available everywhere in America. Every one is a precision product of scientifically exact manufacturing methods, meeting on every point the highest standards of quality as defined by modern mechanical engineering and metallurgy.

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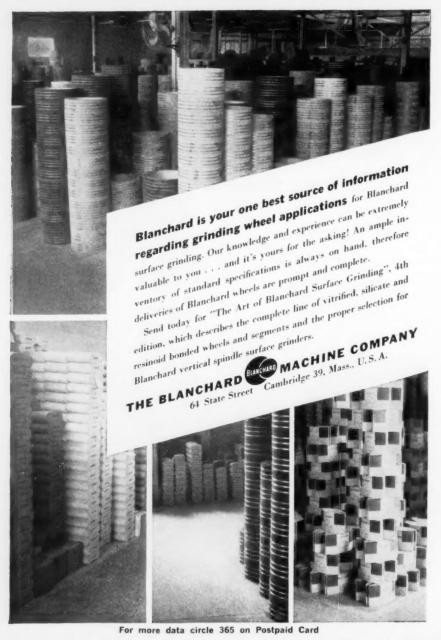
Your Bunting distributor is listed in the classified section of your telephone directory usually under Bars—Bronze, and Bearings—Bronze. Two Bunting factories and eleven Bunting Branch Warehouses expedite distribution in all areas. Ask your local Bunting distributor or write for catalogs.

#### Bunting

BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS OF CAST BRONZE AND POWDERED METAL Ask for Catalog No. 58-Cast Bronze and Sintered Bronze Bearings and Bars Catalog No. 258-Electric Motor Bearings and Cast Bronze Bars

THE BUNTING BRASS AND BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES

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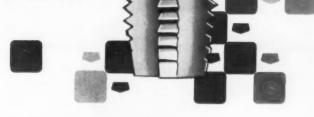


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Skill-produced Butterfield drills, reamers, taps, dies, counterbores, cutters, end mills, hobs and carbide tools are as close as your phone. Warehouses in Chicago, Cleveland, Detroit, Fort Worth, Los Angeles, New York and San Francisco.

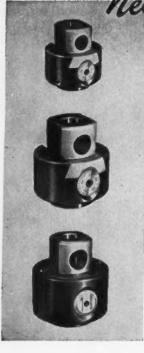
Call your Butterfield Distributor.



#### BUTTERFIELD

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#### New from Criterion!



#### 3 NEW BORING HEADS WITH THESE OUTSTANDING FEATURES

Round-body design Cross-hole for greater range Short - compact construction Sizes — #102 has 2" diameter #103 has 3" diameter Boring range — 1/16" to 8" and larger

#### NEW 3" DIAMETER MODEL #203 INCLUDES THESE ADDITIONAL FEATURES

Protective cap houses all moving parts Friction lock dial face permits return to zero setting.

#### THESE NEW HEADS TAKE $1/2^{\prime\prime}$ or $3/4^{\prime\prime}$ SHANK BORING TOOLS AND BORING BARS

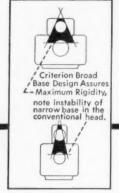
#### RUST-RESISTING BLACK AND SATIN-CHROME FINISH

Offset range —  $V_2$ " in 2" dia. model 34" in 3" dia. model Complete line of high-speed and carbide boring tools to fit all Criterion Heads carried in stock.



CRITERION BORING HEADS are better because they combine utility with simplicity of design — see sketch to the right for one of many features.





Consult your Criterion Dealer or write for free literature. For more data circle 367 on Postpaid Card

modern machine shop

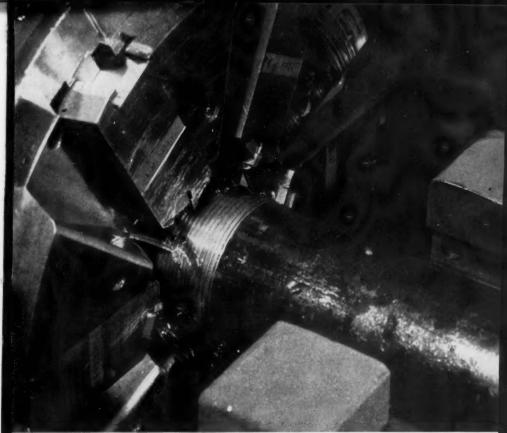
January, 1959

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Easy excelled other a produc

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This is just one of the many applications of Sunicut 85, which is one of a whole series of Sunicuts . . . all transparent.

#### SUNICUT 85 is a heavy-duty cutting oil that lets you see what you're doing

Fransparent, fast-draining Sunicut® 85 eaves the workpiece clear for inspection as you go.

Especially designed for use on high-alloy teels, Sunicut 85 is ideal for heavy-duty work on automatic screw machines and production form grinders. It's a natural or pipe threading and similar heavy-duty perations requiring frequent and close nspection.

Easy pumping, fast metal-wetting, and xcellent extreme-pressure lubrication are ther advantages of Sunicut that lead to roduction economy for you.

Ask your Sunoco representative about saving money with Sunicut, or write to Dept. MM-1.

Industrial Products Department

SUN OIL COMPANY, Phila. 3, Pa.



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# SYNTRON Vibratory

# **LAPPING MACHINES**



easier, at lower cost — by continuous process lapping and/or polishing

SYNTRON Lapping Machines produce metallographic finishes and precision flat surfaces in production quantities easier and more uniformly than with hand lapping methods.

SYNTRON Vibratory Lapping Machines work on an electromagnetic principle eliminating all mechanical wearing parts and assures dependable service with low maintenance.

Available in sizes capable of handling parts up to 35" in diameter. Improve product quality with SYNTRON Lapping Machines.

Write for free illustrated brochure.

#### SYNTRON COMPANY

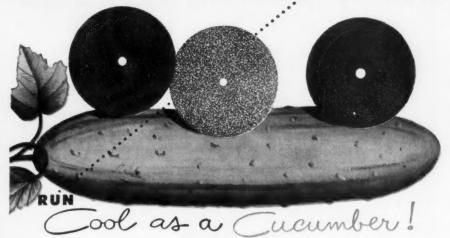
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### **SIOUX** Abrasive Discs



⊚ It isn't enough that they be tough, flexible, long-lasting, and non-loading. Sioux Abrasive Discs must remain "cool as a cucumber." Constant research in the Albertson & Company Abrasive Division has been directed toward lowering the grinding temperature. And steady progress has been made. Today's Sioux Abrasive Disc runs significantly cooler than ever before!



Here's where they "beat the heat." It's the modern air conditioned home of Sioux's Abrasive Division. Here precise humidity and temperature control provide ideal working conditions. This careful atmospheric control is important in keeping the discs flat and preventing curling during production and in storage. Exclusive, advanced production methods are employed here on equipment much of which was designed and built by Sioux. Here also, constant research is carried forward to insure that Sioux Discs continue to deliver the top value for your abrasive dollar.

for more information write . . .



#### ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

AIR IMPACT WRENCHES AIR SCREWDRIVERS © "PELICAN" NUT ACCUMULATORS © DRILLS ELECTRIC IMPACT WRENCHES © GRINDERS © SANDERS © POLISHERS © FLEXIBLE SHAFTS © SCREWDRIVERS © PORTABLE SAWS © VALVE FACE GRINDING MACHINES © ABRASIVE DISCS FOr more data circle 370 on Postpaid Card

January, 1959

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65



HERE'S PROOF OF PERFORMANCE from Anderson Duggar, Jr., president of Equitable Engineering Co. - "How do we like our Clausing 15" geared-bead lathe? We want another just like it! Our people really surveyed the market thoroughly before deciding on the Clausing believe me, it's everything it looked to be and more. The Clausing is an extremely accurate lathe and its features and ease of operation are making us money,"

Clausing geared-head lathes do lead their field in capacity, performance and value. Here's why:

They're bigger in capacity than other lathes in their class. Larger spindles, larger thru-hole capacity, larger bearings for heavier work. 17" lathe spindle, for example, has 3-1/16" thru hole - 15" lathe, 2-1/16" hole - 13", 1-9/16" hole.

Have heavy-duty construction throughout. Bed ways are induction hardened. Gears in head and quick-change box run in bath of oil. Power feeds are taken from separate feed rod, lead screw is used for thread cutting only. Spindles are high-tensile steel.

Built for precision performance to American standards of toolroom lathe accuracy. Have Gamet Micron tapered roller bearings with oil flow lubrication - the most advanced and accurate bearings known to industry.

Each is an outstanding value. 13" cabinet base models, including motor and controls, start at \$2113; 15" cabinet base at \$2988; 17" at \$4715. You owe it to yourself to investigate before investing in any lathe.

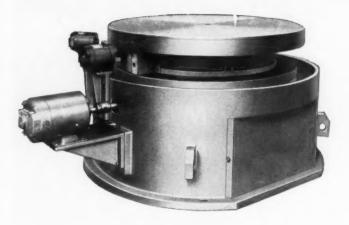
Lathe Capacities: 17" lathe: 54" and 78" centers, 28" swing in gap; 15" lathe: 30" and 48" centers, 24" swing in gap; 13" lathe: 24" and 36" centers, 18" swing in gap.

#### CLAUSING DIVISION Write for Free Literature ATLAS PRESS COMPANY

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KALAMAZOO, MICHIGAN

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### drill varied hole patterns without changing set-up

If your drilling, tapping, or milling jobs require even, uneven, or skip indexing, this new Electrodex table will give you more flexibility than ever.

Set up your work piece just once on this table, and you can drill many different hole patterns. Changeover from one index pattern to another is fast. You can do it mechanically—with index rings or inexpensive templatesor by push-button electrical counting.

Eight-channel numerical tape control is available. You get indexing accuracy to ±.001" at a 45" diameter. And you can choose your table size from 30", 45", 60", and 80" diameters.

Bulletin 258 gives complete details. Avey Division, The Motch & Merryweather Machinery Co., Box No. 1264, Cincinnati 1, Ohio.



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#### **ROLL MARKS 6,000 PIECES PER HOUR**

Here is another Noblewest achievement for faster, better marking at lower cost. Designed especially for high production marking of thin walled cup-shaped parts or tubes. Model 482, illustrated, is shown tooled for *Roll Marking* a famous name garden hose accessory. Operator simply loads the parts onto the work feed dial. From that point, the process is completely automatic.

Whatever your requirements for permanently indented marking, you are assured of the finest when you specify Noblewest. Write for comprehensive catalog. Noble & Westbrook Manufacturing Co., 25 Westbrook Street, East Hartford 8, Conn.

A few desirable territories open to qualified reprsentatives

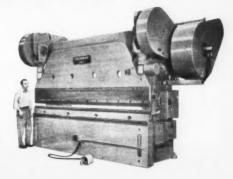


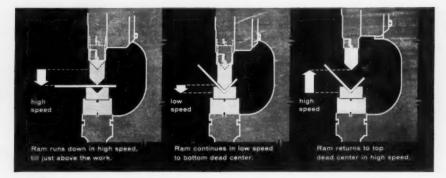
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10 to 60% increase in production makes

#### CINCINNATI® AUTOMATIC CYCLE

the most important press brake development in years!





Cincinnati® Automatic Cycle is a brand new feature which automatically provides two speeds to the ram for each stroke. It eliminates the "whip-up" of a sheet's free end that occurs when light gauge metal is formed over a small die opening at high speed.

Unlike previous attempts at reducing whip-up, the Automatic Cycle does not slow down the entire stroke of the press brake's ram. Nor does it require clutch slipping, which depends entirely on operator skill and at best is unreliable.

Think what these advantages can mean for you:

 Actual job records show 10% to 60% increase in parts produced per hour.

2. You can set the length of the low-speed working

portion of the ram stroke. Once this is set, all strokes are identical, which insures absolute consistency in the work.

Work spoilage (such as back bends caused by whip-up) is eliminated.

4. Highly experienced operators are not required.

Operator fatigue is greatly reduced by eliminating clutch slipping.

Clutch and brake are long-life, minimum-maintenance units requiring no adjustments.

This productive new feature is available now on all 7 and 9 Series Cincinnati Press Brakes.

Write Dept. G for Bulletin B-9R, which gives full details about Cincinnati® Automatic Cycle.

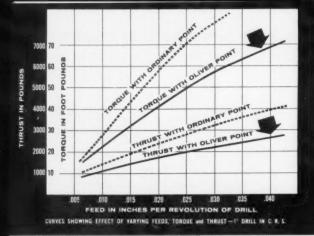
Shapers / Shears / Press Brakes

# SHAPER ...



Cincinnati 11, Ohio, U.S.A.

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# OLIVER'S UNIQUE DRILL POINTER gives you more holes per grind

Substantially less torque—much less thrust!

The above graph is a typical test run by the research department of an eastern engineering school. It is evidence that Oliver can help you get more and better holes per grind.

Oliver's sharpening principle is to grind the drill point so that increased clearance is obtained at the center of the drill. Each lip does its equal share and the theoretically perfect point permits easier penetration. Less feeding pressure means savings on drilling machine repairs, power and transmission costs and the drills themselves. The Oliver point has been successfully used since 1921.

Oliver drill pointers are rugged enough to stand up to every day pounding. Features of the Model #510 include: a universal chucking head which holds drills from ½ to 3 inches in diameter and swivels to give varying angles from 82 to 160°; an adjustable cam to give a variable amount of clearance at the cutting edge; and a positive drive to the chuck. In addition, all main shafts—including the grinding wheel spindle—are mounted on anti-friction bearings.

Want proof? Oliver will sharpen your drills on a "no-charge" trial basis. Write today for full information. We'd like the opportunity of sending a quotation.

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# OLIVER of ADRIAN 1430 E. Maumee St. - Adrian, Michigan

DRILL GRINDERS AND THINNERS-TOOL AND CUTTER GRINDERS-AUTOMATIC AND MANUAL FACE MILL GRINDERS-TOOL BIT GRINDERS-CONTOUR SAWING AND FILING MACHINES.

#### HOW TO REDUCE YOUR TWIST DRILL COSTS

Any substantial reduction in drill costs must be made by choosing a combination of the right drill design and drill point. As specialists in the manufacture of tool and cutter grinding machinery we are able to offer drill pointing machines designed expressly for cost reduction.

It is a widely accepted fact that for a given feed the angle of helix of the



feed is greater as it approaches the center. The Oliver pointers provide average thrust reductions of 25.2% and average torque reductions of 22.0%.

The Oliver makes possible the trouble free grinding of drills—whether 2, 3 or 4 flute. Variable included point angles and clearances are easily obtained.

This cost-saving point is also available

by using the new heavy-duty #21 bench model machine. Capacity is 3/32" to ½". A 5" diameter cup wheel and a built-in diamond dresser provides



for easy operation regardless of drill size or included angle.





The sketch above shows a comparison of two drill points. The one on the right is as ordinarily ground. On the left is an exaggerated view of an Oliver drill point. Note that the clearance angle on the point increases very rapidly as the drill web is approached.

is BEST for YOU!

#### HERE'S WHY:

- LONGEST RAM TRAVEL with maximum hydraulic power throughout entire stroke.
- REMOVABLE CYLINDER for independent hydraulic power away from the press.
- CYLINDER TRAVEL full width of press, either way.
- OPEN ENDS allow long pieces to extend through sides of press.
- EXTRA WIDE inside work space to handle bigger jobs more easily.
- GREATER STRENGTH with heavy bar stock sides and pins—bearing blocks support bolster to give uniform distribution of pressure.

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d.

Rodgers 100 tan shop press with top mounted Greenlee Power Pump ... cylinder travels width of press.

Radgers 100 ton shop press with Radgers 2 speed Hand Pump.

When you invest in a shop press it is more important to compare performance than initial cost!

Rodgers Shop Presses are designed and built for the most versatile service, and longest trouble-free life. In the shop they handle hundreds of diversified jobs... pressing, bending, straightening, assembling. For field work the Rodgers cylinder and pump are easily removed from the press, making an ideal portable power unit for jacking, lifting, heavy shaft removal and similar work.

Rodgers produces the most complete line of shop presses available—capacities from 60 to 400 tons—in varied standard models with power pumps, top mounted or placed at the side—or hand pumps with 2 or 3 speeds.

When you compare shop press performance and cost you will find a Rodgers is best for you, too. Ask your Rodgers Representative for complete details—or write us.



Rodgers Cylinder and Pump are easily removed from shop press (such as above) for off-press jobs.

SEND FOR NEW CATALOG

It gives useful information and complete specifications.



#### RODGERS HYDRAULIC, Inc.

Pioneers in High Pressure Hydraulics Since 1932

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January, 1959

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# ofime DIAL INDICATOR

With the

Movement





... not only tough-hardened, but precision-hardened by a special method which greatly increases useful life of vital wear parts (gears, rack and pinion) and improves performance as well. This new hardened gear movement is available on most Federal Dial Indicators.

calibration than regular Indicators. And, since the hardened gear Indicator operates slight dimensional changes, so you have an Indicator of greater sensitivity as well. more smoothly, it exerts less contact pressure and provides quicker response to Comparative tests show that Indicators with hardened gear movements have 16% to 25% less friction, far better repeat accuracy, and greater stability of

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STOCK PUSHERS FEEDOUT CAMS





# AIR-FEED AUTOMATICS

You don't need costly stock pushers and feedout cams with Greenlee Air-Feed Automatics. Air lines are connected to the tubes by quick couplings. Vacuum pumps withdraw pistons for fast restocking. Ask your Greenlee

> Representative to show you other ways of beating high production costs with Greenlee Air-Feed Automatics.



- √ Wide-open tooling area
- ✓ Interchangeable tool holders
- ✓ Easy-to-change stationary type collets

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GREENLEE BROS. & CO. 1748 MASON AVENUE ROCKFORD, ILL.

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# Proper Use of Coolant Means Better Abrasive Cutting

 Wet abrasive cutting eliminates burning, minimizes burr, and gives a finer finish than any other cutoff method—and the key to this quality is proper coolant application. Here are the three essentials of adequate cooling:

1. Volume of coolant, rather than pressure, must be kept at a high



Radial beles in ALLISON wheels carry coolant deep inside the cut itself. This extra cooling action assures clean cuts and maximum wheel life on solids from 2" to 12" round or square. These holes also impart a self-dressing action to the wheel, keeping sharp grits exposed for cool, fast cutting.

level for maximum wheel life.

2. Coolant must be accurately directed to the *point of contact* between the wheel and the work, because this is the point at which most heat is generated.

Coolant must be applied equally to both sides of the wheel to avoid crooked cuts and wheel breakage.

#### Allison-Campbell Design Assures Proper Cooling

High volume of coolant is provided by a large reservoir and an extracapacity coolant pump.

Good distribution of coolant is assured by a coolant distributor, standard on all CAMPBELL machines. This can be adjusted and locked in position to provide equal distribution of coolant to both sides of the wheel and to the work.

High-speed, quality cuts on almost any material are possible with modern abrasive cutting techniques. Your ALLISON-CAMPBELL Field Engineer will be glad to recommend the right machine and wheels for your cut-off jobs. Call on him for help.

A complete selection of machines and wheels for any cut-off application is offered by ALLISON-CAMPBELL. Four types of CAMPBELL machines—chop stroke, oscillating, horizontal, and rotary—in capacities from the smallest stock to 14" rounds... billets up to 12" square... plate up to 6" thick and 20 ft. long. ALLISON wheels—more than 150 different specifications—rubber or resinoid bond—3" to 34" diameters—.006" to 3/16" thick.

Write for a copy of DH-20, a new bulletin describing the ALLISON-CAMPBELL Demonstration Laboratory, and how you can take advantage of the special services it offers. Complete details on ALLISON wheels and CAMPBELL machines are also available.

#### ALLISON-CAMPBELL DIVISION AMERICAN CHAIN & CABLE

931 Connecticut Avenue, Bridgeport 2, Conn. For more data circle 379 on Postpaid Card



# IOCKFORMER BETT-MARR BAND SAW

- 24" throat without 24" bulk . . .
  - Variable speeds without speed reducer power losses . . .
    - Heavy-duty, production cutting
       at half the price you'd expect to pay!

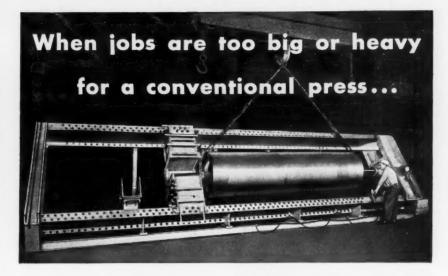
Big enough for almost any sawing job, small enough to fit most anywhere, the Lockformer Band Saw's low cost makes it a practical and profitable investment for any shop. Blade speeds of 100, 600 and 3000 fpm give production speed cutting on wood, plastics, forgings, steel plate, non-ferrous metals and stainless steels. Ball bearings with neoprene seals, cemented carbide blade guides, friction-free and slip-proof chain for final drive and many other top-quality features.

WRITE FOR bulletin giving full facts.

#### THE LOCKFORMER CO.

Dept. MS, 4615 West Roosevelt Road Chicago 50, Illinois

In Canada: Brown Boggs Foundry & Machine Co., Ltd., Hamilton, Ontario For more data circle 380 on Postpaid Card



THE DAKE HORIZONTAL INCLINED PRESS is recommended for work on jobs that are so big or heavy that it is more convenient to do press work while they remain suspended from an overhead crane or hoist.

For instance in the illustration above, a 7-inch shaft is being pressed into the cable drum for a 200-ton overhead traveling crane. The drum is 17 feet long and 4 feet in diameter, and is supported on a crane hook.

This particular press (Model 32-100) is 33 feet long overall, and has a daylight opening of 25 feet. It has 300 tons capacity, a 60° inclined frame, 26-inch stroke, and a ram-to-table distance from 25 inches to 25 feet. The table is moved along the frame with a hand winch.

Dake Hydraulic Presses are engineered to meet such a variety of shop requirements that the engineering is probably almost done on the press you need. Let us quote.

DAKE CORPORATION, 612 Robbins Road, Grand Haven, Michigan

DAKE















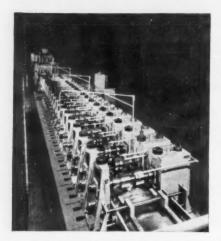
# Steel Roof Decks and Flooring cold rolled up to 200 f.p.m. on this mammoth







#### ROLL FORMING MACHINE



ARDCOR Roll Forming Machines feature: Unit Design — spindles in self-contained SEPARATE HOUSINGS, with speed reducers; Large Range of Vertical Centers; Double Bearing Design of Drive Housings; All Bearings are Anti-Friction; Micrometer Type Dials and Scales.

This entire automated production line is 15 ft. wide, 6 ft. high and 120 ft. long with total equipment weighing approximately 175 tons. Mill stands are completely movable, having 4½ in. dia. spindles with 42 in. roll space. Fed by 20,000 lb. steel coils, the twenty-two roll passes form the 1½ in. deep by 2 ft. wide sections. The mill operator controls the loading, lining-up and feeding of the coil stock from a control bridge at entry of the mill. A 150 ton Straight Sided ARD-COR Press cuts off sections to proper lengths.

ARDCOR Roll Forming Machines are available in six standard sizes, other sizes to customer specifications.

If your products can be cold roll formed, ARDCOR engineers can supply advancements in design and construction to produce them better . . . at greater speeds and profit!

Consult our Engineering Facilities, without obligation . . .

#### American ROLLER DIE CORP.

29590 Clayton Avenue

Wickliffe, Ohio



DESIGNERS, ENGINEERS AND BUILDERS: Single Roll Forming Machines or Campletely Automated Production Lines for Cold Forming, Ferrous and Non-Ferrous Electric Weld and Lock Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Princh and Leveller Rolls • Cut-Off Machines • Slitters

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# You never knew you could do so many things with MODERN ABRASIVES!



#### TIME SAVING FEATURES

Works to close tolerances
Can be shaped to contour
Produces conventional and special finishes
and patterns, frequently the final polish
No before-use preparation or dressing
No skilled labor required

#### GENERAL USES

Removing light digs, tool and heat marks Cleaning welded and soldered joints Burring and finishing castings, stampings, machined and molded parts Maintenance of tools and machinery

#### Say goodbye to many older, costlier metalworking methods

Today, use Brightboy, the modern finishing medium that will perform many types of work previously unrelated with abrasive uses.

Brightboy's wide scope begins where conventional abrasives leave off. Its unique working action results from rubber and Silicon Carbide or Aluminum Oxide abrasive grains working simultaneously: BURRING, CLEANING, FINISHING, POLISHING, in a single-step operation! Readily available STOCK grains and textures are IOB-MATCHED to your job!

#### WRITE US NOW FOR:

- . SAMPLE BRIGHTBOY HAND TABLET
- CATALOG LISTING
   GRAINS, TEXTURES, MACHINE SPEEDS
- NEW METHOD RECOMMENDATIONS and for name of nearest Brightboy distributor

BRIGHTBOY INDUSTRIAL DIVISION WELDON ROBERTS RUBBER CO.

95 North 13th Street . Newark 7, N. J.

America's Pioneer Manufacturer of Rubber-Bonded Abrasives



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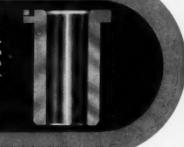
#### you get close tolerance drilling with

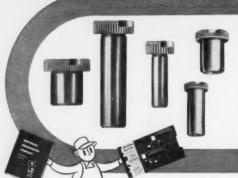
#### UNIVERSAL DRILL BUSHINGS



Accurately machined bushings are essential when drilling to close tolerance. UNIVERSAL DRILL BUSHINGS, of finest quality steel, are carefully tested for 100% concentricity and hardness, assuring pin-point accuracy and uniform quality. To prevent tool hang-up and breakage, each bushing has a blended radius on the top inside diameter.

All bores are superfinished. This superfinishing of bushings is important, especially in close tolerance work, because it reduces both tool and bushing wear to a minimum. Knurled head gives a quick, sure grip.





We stock drill bushings in all standard sizes and lengths at each of the following offices—Universal Engineering Sales Co., 1060 Broad St., Nework 2, New Jersey; 5035 Sixth Ave., Kenosha, Wis., and at our home office in Frankenmuth. Contact the nearest office for immediate delivery.

The Universal Drill Bushing Slide Chart gives accurate engineering data for the selection of all types and sizes of drill glaushings up to 1½" drill size. You may have one—free—by requesting on your company letterhead. At the same time, get your copy of our new catalog that describes all of UNIVERSAL'S products including chucks, tool holders, boring bars, bushings and index plungers.

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 9, MICHIGAN

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# Bill Lenkeit tells why his Jig Boring and Jig Grinding Room is "all-Moore"

This is another in a series featuring the views of owners of leading contract tool and die companies



#### by WILLIAM LENKEIT

President
Lenkeit Machine & Tool Co., Inc.
Farmingdale, L. I., N. Y.
Precision Tooling, Contract Jig
Boring and Jig Grinding

"Like other modern contract plants where close-tolerance work is the rule, we have a special air-conditioned room housing our jig borers and jig grinders. In ours, the nameplate on every machine reads "Moore."

"We have always sought to obtain the best possible equipment for each type of operation. That is why our facilities list includes outstanding machines of Swiss and Cerman manufacture, as well as fine American-made equipment. But when it came to jig boring and jig grinding, we found there was no equal to Moore machines for built-in accuracy, versatility and ruggedness.

"We now have three Moore jig borers and one Moore jig grinder, with another borer on order. We use this equipment extensively for operations on the precision dies, jigs, fixtures and inspection gages we build for leading Eastern companies in the instrument, electronics, electrical and printed-circuits fields. We also do a considerable amount of contract jig boring and jig grinding for instrument companies which naturally have close-tolerance requirements.

"What do we like best about our Moore equipment? These machines are ideally suited to our day-to-day tool-room work—quick setups, convenient controls and, most important of all, unmatched accuracy. Our machines have been in almost constant use since they were installed and they are just as reliable as ever.

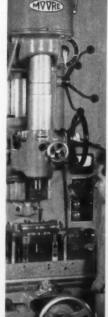
"Our all-Moore facilities for jig boring and jig grinding are a major reason why we can say: 'It pays to tool it right at Lenkeit'."

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HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts the modern way. 424 pages, 495 illustrations. \$5 in U.S.A., \$6 elsewhere.



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#### OVER THE EDITOR'S DESK . . .



#### A GOOD START

During the closing months of 1958, an upsurge in business activity gave impetus to a tide of optimism which is certain to project itself far into the coming months. From a report prepared by Dr. Gordon W. McKinley and a staff of economists, we find the statement that all major segments of the nation's economy will be on the upswing during 1959. It estimates that consumer purchases will increase by \$16 billion to a record total of \$307 billion. It sees a modest increase of approximately \$2 billion in corporate spending on new plant and equipment.

The report predicts that inventory accumulation will stimulate production to the extent of an additional \$7.5 billion, Federal government spending, it foresees, will rise by \$3.5 billion, and outlays by state and local governments will increase \$4 billion. The forecast looks for a \$34 billion rise in the gross national product to a new record level of about \$475 billion, with the U.S. productive machine approaching capacity operation by the end of 1959. Meanwhile, the report says, employment will increase about 1.6 million, "sufficient to absorb the expected growth of the labor force

and to reduce unemployment to a normal level by the second half of the year."

From another source, government specialists expect total spending for new construction to be up 7 per cent in 1959, passing the \$50 billion mark for the first time. Public building will provide most of the gains, with a bulge of over \$2 billion expected in this category over 1958. Official government predictions are for 1,200,000 new home starts this year. This pickup in home building will undoubtedly influence the manufacture of refrigerators, freezers, ranges, dishwashers, and the like.

Unless some unforeseen economic calamity or political catastrophe arises, the year 1959 should witness the most favorable business climate that we have seen for a great many years.

\* modern machine shop

#### NO FREE LUNCH

Mr. W. G. Vollmer, President of Texas and Pacific Railway, in an advertisement which appeared in the Dallas Morning News, eloquently expresses a sentiment that might well be the watchword for this year of 1959. He says: "There is no such



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OVER THE EDITOR'S DESK . .



thing as a free lunch . . . not even when the Government provides it. Every lunch has to be paid for . . . by somebody. The same is true of Government aids, benefits, and services. They are not free. All of these things have to be paid for by somebody, and that somebody is we . . . the people.

"There is no such thing as 'federal funds.' That term is a wolf dressed up in sheep's clothing, and it deceives a lot of us into feeling that whatever we get from the Government is free. Congress does not possess an Aladdin's lamp or a financial wishing well. Every dollar the Congress appropriates, and every dollar the Government spends, must come out of the earnings of we . . . the people. There is no one else to pay the bills.

"The more the Government spends for free school lunches, for free inland waterways, for free airport terminal and airway services, for free hospital and medical services, for free slum clearance projects, for free farm price support programs, the more the Government must tax us. And that means that each of us has less to spend . . . or to save. Not all taxes are visible. Most of them are not. We see the withholding and excise taxes. But we do not see the multitude of taxes hidden in the price of everything we buy.

"The Government has only one source of income. And that source



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#### OVER THE EDITOR'S DESK . .



is we... the people... all of us. The Government does not produce wealth. Only the people do that. The Government consumes wealth. If the Congress appropriates and appropriates, and the Government spends and spends, then all of us are going to be taxed and taxed and taxed. And so will future generations. If we demand 'free lunches' and 'free Government aids and benefits and services,' we must pay the Provider 'in taxes.'

"And that's the only way it can be done."

\* modern machine shop

#### TRIBUTE TO MR. WHITNEY

In the Foreward of a brochure titled "The Founder of Modern Industry," Mr. Letcher W. Bennett, President, Bennett Machinery Company, writes "In the year 1956 the United States passed a milestone vet to be attained by any other great nation: the number of persons employed in the production of goods became fewer than the number employed in all other activities. This was achieved because machines enable workers to produce such vast quantities of foods, minerals, construction and manufactured goods.

"It is a curious fact of history that the man who initiated the "machine age" in America, who originated the machine tool industry, the American system of manufacture and who otherwise has been largely responsible for molding our nation, is remembered today chiefly for one accomplishment, the invention of the cotton gin.

"Eli Whitney deserves the recognition not only of us engaged in the machine tool industry, but all who benefit by the consequences of his genius. This brief tribute is published in the hope that it will help in some measure to bring to the memory of this great American some of the esteem he so richly merits."

The brochure "The Founder of Modern Industry" will make a worthy addition to the reading material of every metalworking executive. For your copy, address your request direct to Mr. Letcher W. Bennett, Bennett Machinery Company, Clifton, New Jersey.



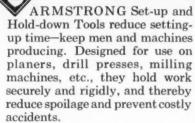
" . . . and furthermore, I don't like the SHAPES of things around here, Wilford!"

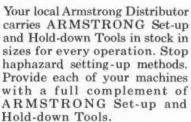
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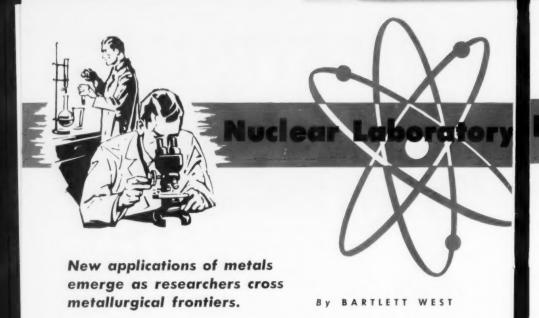






T-SLOT BOLTS AND NUTS

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Nuclear Metals, Inc., a pioneer organization in this country devoted to the research and development of materials for nuclear work, recently dedicated its \$2,000,-000 highly functional laboratory located in Concord, Mass. Its most recent assignments include the development and manufacture of fuel elements for the Enrico Fermi Fast Breeder Reactor and development of nose cone materials for re-entry into the earth's atmosphere. Between these assignments, it has worked on virtually every existing metal in the development of new materials for the Nuclear-Space Age.

Nuclear Metals was formed in 1942 as the Metallurgical Project of Massachusetts Institute of Technology and continued under MIT auspices until 1954, when Arthur D. Little, Inc., and Allegheny Ludlum Steel Corporation were selected by the Atomic Energy Commission to continue the activities of the Metallurgical Project. In addition to serving as a prime contractor to the AEC in the research and development of new materials, Nuclear Metals has carried out extensive work for the Department of Defense and private industry.

One-third of the cost of the new laboratory building is accounted for in the installation of safety equipment to safeguard employees and the community from possible hazards of working with modern metals and materials, some of which are difficult to handle. In addition to the elaborate in-plant safety devices, NMI has eight property-line monitoring stations to sample air, soil, ground water and rain and

#### **Permits Look Into The Future**

snow for any evidence of environ-

mental changes.

The plant features 32 separate ventilating systems capable of exhausting nearly 150,000 cubic feet of completely filtered air per minute from the working areas. This air is collected, washed, and filtered by specialized equipment before being released to the atmosphere. An emergency 140 kw. standby Diesel generator and associated equipment insure continuity for all essential experiments and services in the event of power failure, "Ordinary" power, up to a maximum of 3,000 kw., is supplied through a new substation especially erected for NMI.

Giant vacuum cleaning system extends in duplicate throughout the building. All floors are of a special easy-to-clean plastic. A drain system of Pyrex glass serves all laboratories using acids, while a completely housed facility treats the wastes to eliminate exterior environmental hazards. Yard hydrants, sprinklers, and a completely equipped fire brigade provide protection against fires.

High voltage electric lines to supply heavy machines, induction heating devices, and other equipment are placed under-floor to minimize electrical hazards.

Closed-circuit television is in service on a 24-hour per day basis as a safety and security measure. Heating plant and air compressors are duplicated to provide service in case of failure of one plant.

NMI maintains a complete clinic for medical examinations, first aid treatment, and X-ray examinations, and employs a full-time nurse and the part-time services of a physician and special health and safety consultants.

"No single material with which Nuclear Metals works requires such elaborate protective apparatus," H. H. Willis, president, said. "We work with a large number of so-called 'exotic' materials for the nuclear-space age," he said, "and the protective apparatus we have installed will protect our employees and the community against any foreseeable hazard."

At the dedication of the new metallurgical laboratory, Dr. Albert R. Kaufmann, vice president and technical director of Nuclear Metals, Inc. had the following comments to make:

1. Small vehicles, indirectly powered by atomic energy. Polon-

#### "Polonium, produced by neutron bombardment of bismuth, generates about 100 horsepower per pound."

ium, which is produced by neutron bombardment of bismuth, generates about 100 horsepower per pound. (Drawbacks: material is toxic, requires many neutrons for transmutation of bismuth, and effective running time of about four months will limit its use to highly specialized applications.)

2. Highly efficient power reactors using molten uranium or plutonium fuel. Best bets for effectively containing these high-temperature, corrosive materials: yttrium for uranium and tantalum or vanadium for molten plutonium. 4. Development of the metallurgy of tungsten, molybdenum, tantalum, and niobium to the point where sheet, bar stock, and tubing are readily available.

5. The use of beryllium in aircraft, missiles, and space vehicles.

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6. The use of composite materials in which one layer serves as a protective coat, another gives strength at low temperatures, a third at high temperatures, and so on.

Major problems the metailurgist must solve in the coming years, Dr. Kaufmann believes are:

1. Delineation and then solution



Flexible exhaust tubes over each unit are a feature of the machine shop of the new research and development laboratory. In addition to routine ventilation of each machine for reactive and toxic materials, special hoods with absolute filters can be placed on any machine for the purpose of handling "special" materials, such as enriched uranium.

#### ". . . nuclear power offers man's best hope for invasion of deep space."

of the materials problems encountered in fusion power systems.

The development of materials to contain nuclear rocket engines operating at temperatures up to

5,000 deg. F.

3. Engineering design to circumvent the probably 20,000 deg. F. temperatures that may be reached for brief periods in space travel. (Highest melting points of any known materials is about 7,000 deg. F.) The magnitude of this problem is seen in the fact that present engineering experience in structural applications, other than for furnace

bricks and lamp filaments, is about 2,000 deg. F. It is probable that a space ship could be designed so that the highest temperatures at critical places will not be greater than 5,000 deg. F.

4. Learning to cope with the corrosiveness and toxicity of uranium-233, -235 and plutonium, and less cumbersome handling of fission

products.

Dr. Kaufmann also believes that nuclear power, either direct or through the production of special propulsive fuels, offers man's best hope for invasion of deep space.



Diamond dress of carbide dies and an inspection of drawn Zircaloy tubing in the cold finishing department are among the many fabrication activities of the new research and development laboratory at Nuclear Metals. Two draw benches are shown at the left rear and a hydrostatic tube tester is shown at the extreme right in this illustration.



In which the author gives a comprehensive view of the program, how it operates and how the results are summarized and applied.

By GILBERT C. CLOSE Field Editor, Modern Machine Shop

A major break through in the long-time effort to reduce production costs in non-automated shops and industries seems to have been effectively accomplished by an industrial engineering program inaugurated by and placed in operation at Northrop Aircraft, Inc., Hawthorne, California, on March 1, 1958. Called the PACE Program

(with the word "PACE" derived from the first letter of the four words "Performance and Cost Evaluation"), it has nothing to do with direct costs, but deals instead with factors which are ultimately reflected in total overall production costs. The PACE program was planned upon the insistence of, and now operates under the managerial 120 -

100-

direction of Richard R. Nolan, vice-president and general manager of the Northrop Division. Mr. Nolan took up the problem with F. W. Lloyd, vice president in charge of manufacturing, who put an industrial engineering team on the job. Months of research in close coordination with Mr. Lloyd produced the basic outline of the program. D. N. Petersen, industrial engineer, is in charge of and supervises the operation.

Basically, PACE is a statistical measure of group effectiveness in performing assigned tasks. It tells both management and supervision at a glance at what percentage of total production capacity a group or department is operating. It correlates this percentage of working

"pace" (called the "PACE Index") with other cost-controlling factors such as percentage of schedule produced, percentage of personnel change, budget realization, and quality and parts shortage indexes, in a single, weekly cumulative chart so that management and supervision can note immediately at what percentage of full capacity a department is working at the time, the general trend of this PACE Index, and how the trend of the PACE Index is affecting the correlated cost-controlling factors. (See Chart No. 8.)

Though records show that Northrop Aircraft, Inc., has long been one of the low cost producers in the aircraft field, Vice President Nolan was not satisfied with this status.

### Reduction Tool for Management

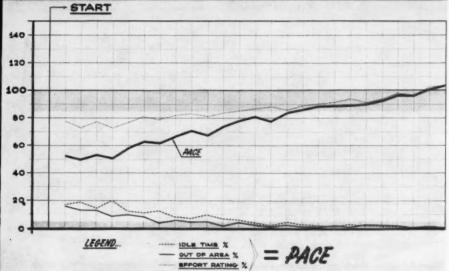


Chart 1—Basic PACE Index and components—Idle time; personnel out of area; effort rating.

#### "An obvious index of PACE effectiveness is the tremendous interest generated throughout the industry concerning its operation . . ."

"Our goal was to become the lowest cost producer in the field," he said. "The PACE program, in conjunction with our other time-tested cost-controlling techniques and programs, is bringing us closer to this ultimate goal."

The effectiveness of the PACE program during the brief tenure of its existence is vividly implied in a Northrop financial report issued October 8 and covering the fiscal year ended July 31, 1958. Though sales during that period dropped about nine percent, earnings per share of stock were up 23 percent. While Northrop officials are hesitant about attributing any

definite proportion of this gain to the PACE program, they willingly agree that PACE was an important contributing factor.

A more obvious index of PACE effectiveness is the tremendous interest generated throughout the industry concerning its operation and progress. A team of Northrop PACE program experts is kept constantly busy briefing visitors from other industries on the program's operation, or lecturing on the program at the invitation of outside concerns. The Air Force itself has become actively interested in the PACE program, and word concerning its effective progress is

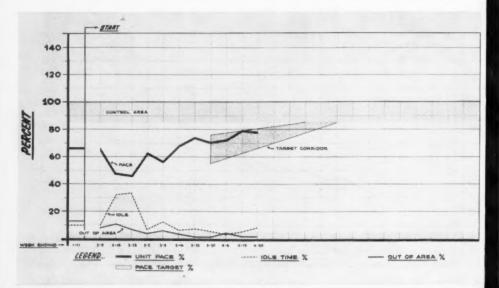


Chart 2-In this chart, the target corridor (shaded area) has been added to the PACE Index.

going out via the military grapevine from the Pentagon in Washington, D. C.

The operating details of the PACE program are far too numerous to be contained in a single magazine article of this length (they require a two-hour uninterrupted lecture for full explanation), but an attempt will be made to give a comprehensive view of the program, how it operates, and how the results are summarized and applied.

To begin with, Northrop officials readily admit that the PACE program would be less effective in a shop or industry where automation prevailed and machines and equipment, such as a moving production line, established the "pace" at which the employees must work. The program will be most effective in that vast majority of shops and

industries where working speed and effectiveness is largely up to the employee himself, his associates, his supervision, and the degree of organization that surrounds him.

As already stated, the PACE program consists of measuring group effectiveness and comparing this measurement, on a continuing basis, with other indexes such as number of personnel involved, budget realization, schedules, quality control and parts shortages. The overall success of the PACE program hinges around a group of welltrained industrial engineers, containing, first, a group of observers, any one of which can walk through an operating shop department and accurately estimate offhand the percentage of maximum speed at which each of the various employee groups is working, and draw logical con-

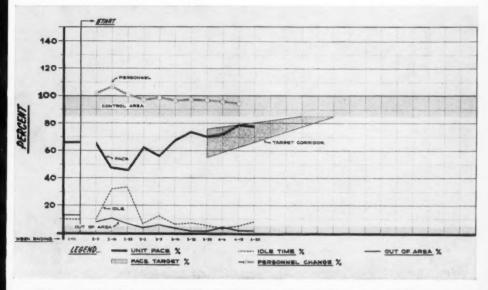


Chart 3—In this chart, the PACE Index in relation to personnel change is graphically shown.

#### "It should be pointed out that the PACE program is not aimed at the individual employee."

clusions as to what is keeping this group from working at 100 percent of its rated capacity. (The 100 percent working capacity is based upon the well-known industrial engineering standard of the energy expended by a man walking 3 miles per hour for 8 hours a day.)

Secondly, the PACE group must contain experts who can take the information handed in by the observers and translate it in terms of trends expounded in graphical form. These simplified yet crystal-clear graphs or charts are then passed on to supervision and management and become the tool with which supervisors or management can determine at a glance the ef-

fectiveness of the various departments within a shop or plant at a specific time and note trends which are either favorable or unfavorable to future operations.

It should be pointed out also that the PACE program is not aimed at the individual employee. If there is a laggard in a group doing an assigned task, it serves only to lower the PACE Index accorded the group by the PACE observer. It is entirely up to the supervisor, after he receives his weekly PACE chart, to determine what is causing an unfavorable trend and to take action accordingly. This serves to keep employee animosity toward the PACE program at a minimum.

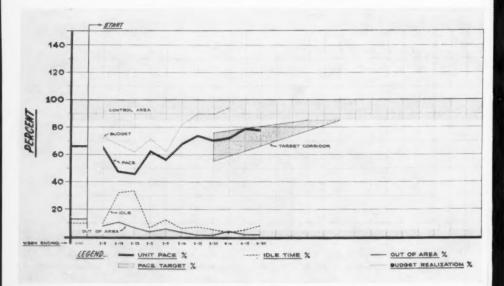


Chart 4-The relationship of the PACE Index to budget realization is shown in this chart.

In fact, the assistant superintendent of the sheet metal shops at North-rop—shops in which the PACE Index has risen 25 percent since inauguration of the program on March 1, this year — says that at least 99 percent of his employees regard PACE as only routine business and pay no attention to the PACE observer during his several daily trips through the department. This is aided, also, by the unobtrusive manner in which PACE operates.

In developing the PACE program, conventional industrial engineering techniques such as Time Study and Ratio Delay Study were discarded at the start. It was noted that these are measurements of individual performance only, and it was considered that the cumulative effort of a group of shop workers

would provide a truer picture of the tempo at which a department was working. So instead of cameras and stop watches, observation of group working tempo on a random sampling basis was established as the pulse-taking operation of the PACE program. If and when the supervisor finds out that specific jobs or operations are curtailing group effectiveness, he can then call for time studies of the job or operation, but this is a function apart from the PACE program.

To get the program rolling, seasoned industrial engineering and supervisory personnel were carefully screened as to their adaptability for observation work, then were intensively trained to rate group effectiveness quickly and accurately. Training films were used for this—films which showed various shop

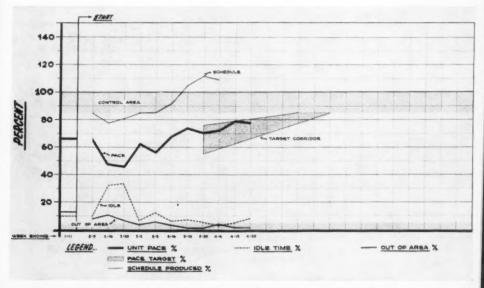


Chart 5—In this chart, the PACE Index in relation to schedule is graphically portrayed.

workers doing numerous jobs at various rates of speed all the way from well below to well above normal maximum working rate. As the films were originally "staged," it was possible for the trainee observers to compare their rating with the known rating at a later time.

Prior to actual inauguration of the program, it was first given a thorough tryout in several selected factory areas where both supervision and personnel were briefed on the operation and aims of PACE. Each week the observer's rating was converted mathematically to a basic PACE Index. This index was compared, on a continuing

basis, with established types of indices such as personnel level, budget realization, schedules, quality control, and shortages. It was quickly determined that a definite interaction occurred between the trend of the PACE Index chart line and the chart lines developed from the established cost-controlling factors. During this trial-and-error adjustment period, the groups under observation contributed many suggestions which helped to sharpen the program's application. In March, 1958. PACE was started officially on a wide-spread basis. Now it is in operation throughout the manufacturing department of the plant,

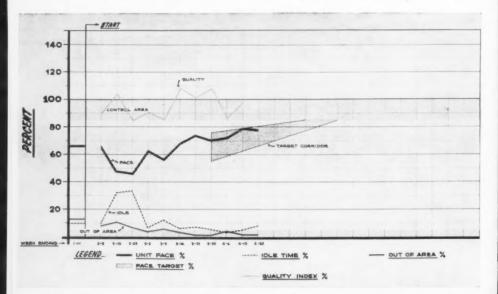


Chart 6—In this chart, the PACE Index in relation to quality is graphically presented.

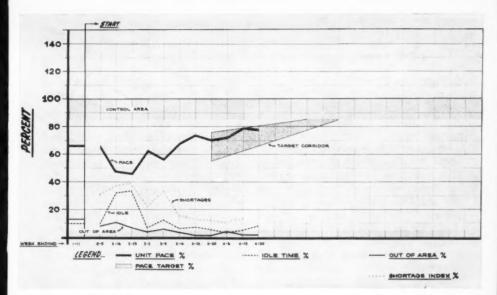


Chart 7-The PACE Index in relation to shortages is graphically shown in this chart.

and is being extended rapidly. Other Northrop affiliates are adopting PACE, and as indicated above, many other firms and the Air Force are interested in its progress.

The heart of the PACE program is, of course, measurement of group effort in doing an assigned task. This is a relatively simple and inexpensive operation as the average PACE observer covers about 750 people in his rounds several times a day. A total of 14 observers are used to cover the entire plant with its 7.000 employees working two shifts daily. Seven more employees in the PACE office develop the statistical data into chart form and supervise the operation of the program itself. Thus, a total of 21 PACE workers have instituted and are operating a program which indicates a gross saving of millions of dollars annually.

To begin PACE measurement, the observer first makes a two-week basic study of the department he will observe. He learns about the department's tasks and explains his mission to the personnel. From that time on, the observer tours the department several times a day on a random schedule, using different routes for each tour. He notes the number of persons working, the number idle, and the number out of the assigned work area, and evaluates the group effort. The later function requires him, in effect, to take a mental picture of the group. He assigns a percentage effort rating based on comparison with the known, established, normal pace of efficient workers.

The observer's findings are then converted into the basic PACE Index by applying this formula:

## "As PACE improves, fewer people are needed to do an assigned task, all other factors being equal."

% PACE = [No. assigned  $\pm$  loans—(idle and out of area)] X effort rate Number assigned  $\pm$  loans X 100

The PACE Measurement Index is plotted on a chart in weekly increments. It is the basic index for indicating the trend of group effectiveness. The goal for each organization is to bring the PACE line up into the "control area" of the chart, This "control area" ranges from 85 to 100 percent of optimum normal effectiveness. (Northrop investigations indicate that 55 to 65 percent is common in the airframe industry. Similar lags in efficiency may be found in other industries where individual production rate controls are difficult to apply.) The beginning point of the PACE line, however low, carries no immediate penalty. What matters most is the trend of the line and the rate of change.

When sufficient time has elapsed for a PACE line to appear on the weekly chart, a corridor leading into the control area at a selected target rate is also entered on the chart. (See Chart No. 2). The group covered by this chart is expected to keep the PACE line within this corridor until it reaches the control area. Chart No. 2, then, is a graphical representation of the cumulative information handed in by a PACE observer during repeated tours of a specific work area. It will be noted on this chart that the target corridor leading into the control area was not established until the program had been in operation for seven weeks. At this point the PACE Index line had developed until a definite trend toward the control area could be effectively established.

Henceforth, this specific work area will be considered "out of control" only when the PACE Index line deviates from the target corridor. But after the PACE Index line enters the control area, the work area will be considered "out of control" whenever the PACE line deviates from the control area.

Charts 3 to 7 show how established control information is correlated with PACE to obtain graphical representation of the interaction between PACE and these other factors. Chart No. 3, for instance, shows the personnel index trend in comparison with the PACE Index line.

It will be noted that as the PACE Index line goes up, the personnel index line comes down. This personnel index is the ratio of department population for the current week as compared to a base week. As PACE improves, fewer people are needed to do an assigned task, all other factors being equal. So the favorable downward trend of the personnel index line in Chart No. 3 is considered normal.

Chart No. 4 shows the budget realization index added to the PACE chart. The budget realization index is computed from the ratio of earned hours to actual hours spent (with the learning curve taken into consideration). As the PACE line goes up toward the control area, the budget realization index usually will rise.

Chart No. 5 shows the schedule index added. The schedule index is the ratio of actual production to scheduled production. Being ahead of schedule is just as unsatisfactory as being behind, and creates its own problems. Schedule realization is controlled by varying the number of departmental personnel.

In Chart No. 6, the quality index has been added. The quality index is established from a formula developed by the Quality Control Department. From the PACE program, Northrop officials have learned that quality increases as PACE increases. Thus far, no point of diminishing returns has been established for the PACE/quality ratio.

Chart No. 7 shows the shortage index added. It has been found that shortages have a direct effect on the PACE Index line. Personnel running short of parts tend to slow up to "stretch out" the work so as not to be completely idle. Because of the peculiarities of aircraft production, an operation normally can stand a small number of shortages without PACE being affected noticeably. The shortage index is a ratio of the number of shortages compared to the total number of different parts that should be available. Since this ratio is small, it is multiplied by a shortage ratio so that "out of control" occurs when the index number is over five.

Chart No. 8 is the chart that su-

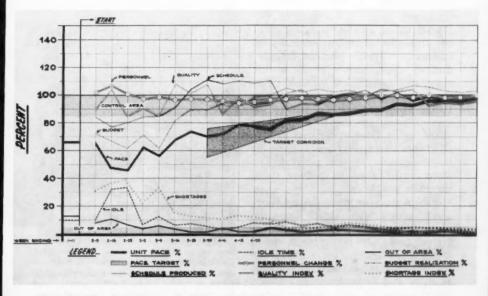


Chart 8—This chart shows all indices combined in a PACE report, distributed weekly.

## ". . . shortages were extremely high at the beginning of the program, so steps were taken to reduce these shortage problems."

pervision and management receives each week, and which tells at a glance how a specific work area or department is progressing toward the major objective of the PACE program-to bring all major cost controlling factors within a department into a predetermined control area. This particular chart is an actual reproduction of a chart covering the progress in a sheet metal department in the Northrop shops. Because this department happened to be one of the trial departments used before the program was inaugurated plant-wide on March 1, the various index lines start slightly before this date. This particular department raised its PACE Index approximately 25 percent during a six-month period. Insofar as the PACE Index line alone is concerned, this represents an increase of approximately 25 percent in productive effort. But a study of the chart will reveal how in most cases the steady upward trend of the PACE Index line either affected, or was affected, by the trends of the other index lines employed. Thus, shortages were extremely high at the beginning of the program, so steps were taken to reduce these shortage problems.

Idle time was diminished likewise, along with out-of-area employees not working at their assigned task. The favorable trend of the PACE Index line carried the budget realization index along with it into, and sometimes above, the control area. It can be noted also

that personnel adjustments served to bring the schedule index into the control area. At the beginning of the program, the quality index fluctuated excessively, yet this index leveled out considerably as other indexes entered the control area.

It may appear from the preceeding discussion of PACE operation that a group's standing—and therefore the reputation of its supervisor—is at the mercy of any frailty or subjective impulse on the part of the observer. This is not possible for two reasons. First, the observers are highly-trained, well-paid professional level personnel. And, secondly, control observations are car-



PACE office crew in Manufacturing Methods Engineering Group consists of two statistical clerks, an analyst, and an artist who prepares chart. The crew tabulates and analyzes data which is turned in by PACE observers and the crew then records it in chart form.

### ". . . the lateral pressures developed by the PACE program are one of its most constructive features."

ried on regularly by PACE supervisors. If the supervisor's reading of a group differs widely from that turned in by the regular observer, the later is given additional training. If discrepancies continue, the observer, is of course, replaced.

Here is a specific example of how a supervisor might use a PACE report. The report shows an increase in out-of-area time. The supervisor checks on the out-of-area assignments made his leadmen. He may find that personnel have been diverted from the assigned job for engineering liaison or some other function which is specifically delegated to another company organization. He makes the necessary correction immediately, and once more has the proper number of people doing the assigned job.

The various weekly charts furnished the supervisors of the shop departments in the PACE program are enlarged to 20 x 30 inches in size and mounted on the wall of the PACE chart room. This room is open 24 hours a day, and the supervisors of any of the departments can enter it at any time to consult their own enlarged chart and make direct comparisons of the progress of their own department with associated departments. Thus, the element of pride is injected into the program along with the inspiration it generates.

Vice President Nolan points out that the lateral pressures developed by the PACE program are one of its most constructive features.



PACE provides timely, continuing measurement of group effectiveness. PACE observer Joe Steinbraker, D. N. Petersen, who directs the program, and Tom Blair, missile manufacturing assistant superintendent, are shown here discussing the organization's rating.

Thus, if excessive "out-of-area" time is affecting a department's PACE index, and this "out-of-area" time is due to employees leaving their assigned task to "chase" parts because of a parts shortage, the supervisor of the department doesn't waste time by going to management with his parts shortage problem. Instead he goes directly to the supervisor of the Production Control Department, "Look!" he says, "your parts chasers aren't doing a good job in my area. We are continually hampered by shortages, and my men have to leave their assigned jobs and chase parts themselves.

## ". . . the PACE program has definitely proved its effectiveness in all production areas."



The U. S. Air Force has taken an active interest in PACE. Here, Major General Wiley D. Ganey, special assistant to the vice commander, Air Training Command, discusses the program with Richard R. Nolan, vice president and general manager of the Northrop Division, Northrop Aircraft, Incorporated.

This is affecting our PACE Index. What are you going to do about it?"

This, Nolan says, brings about quick and immediate action, minus all the excuses and cover-up which normally occurs when management itself tries to correct production problems at shop level.

There are many facets and advantages of the PACE program which are not covered in this article. Literally hundreds of minor bottlenecks have been discovered since PACE information has been made available to departmental supervisors. In an engineering mock-up shop, for instance, it was found that an average of 17 percent of the mock-up employees were continually "out-of-area" doing engineering

liaison work. To correct the situation, an engineering liaison department office was established in the area. Now this 17 percent of the departmental personnel remains busily engaged in doing their assigned tasks.

The PACE program operates on a very democratic basis. When doubt exists concerning any of the information developed by PACE, the PACE observers blame themselves until it has been proved otherwise. When a shop department is first included in the PACE program, the observers make up to 15 trips a day through the department in order to get the true picture of how it operates, and various demental peculiarities which might unjustly affect its PACE Index, Of course, this number of trips tapers off as the PACE Index trends in the department approach the control area.

To summarize briefly, let us just say that the PACE program, as developed and applied by Northrop Aircraft, Inc., has definitely proved its effectiveness in all production areas. Since its inauguration in the shop areas, it has been extended to include the Tool Design and Fabrication Departments, Methods Engineering, Manufacturing Control, Purchasing, Warehousing, Facilities, and the Financial Department. Plans are now afoot to extend it even further into the Engineering Department and into the general business offices as well. This, along with the intense interest exhibited

by all industrial and military administratives who have witnessed the program in operation and heard it explained is sufficient to erase all doubt as to its value.

\* modern machine shop \*

Arc Welding in Machinery design and manufacture. Published by The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio. 224 pages. Illustrated. Gold embossed, board covers. Price \$2.00 in U.S.A., \$2.50 elsewhere, postage paid.

This book offers a source of ideas for the efficient use of steel in machinery. It provides a broad review of current practice in design and manufacture as reported to the Lincoln Arc Welding Foundation in its continuing series of machine

design competitions.

Part I of the book outlines how to approach the problems of welded design and provides a series of check lists and suggestions with which designers and production men can guide their efforts to take full advantage of the excellent properties of steel and the cost reduction potential of welding. These lists point out how the production process of welding influences design decisions, as well as the importance of designing for welding.

Part II of the book contains a brief review of 73 welded designs of a wide variety of machines. The book classifies the designs as to basic type of component: rotating parts, heavy bases and frames, light bases and frames, highly stressed parts, lightly loaded and miscel-

laneous parts. Each design illustrates several ideas of design and construction which have achieved lower costs and better performance. Ideas are illustrated with pictures and drawings and explained briefly to indicate their general application and significance. The designs are indexed for reference both as to type of machinery and as to type of design or manufacturing problem involved. A sample of machine types covered includes: construction, mining, electrical, farming, machine tool, pumping, processing, textile, and so on. Some of the problems reviewed are: appearance, assembly, breakage, corrosion, delivery, finishing, flexibility, impact, machinery, rigidity, and vibration.

#### Magnified Vision Aids Research



Illustration shows a technician at Research and Development Laboratory of Hughes Aircraft Company in California using a powerful binocular magnifier, called a Magni-Focuser, to inspect a high precision gage. Magnifier leaves the operator's hands free to work with the aid of greatly enlarged vision in third dimension.



Aerial view of Westinghouse distribution apparatus department's new Bloomington plant.

# How Modern Facilities Provide For Apparatus Production

New plant is designed for producing products used in distribution of electric power.

By FRED W. VOGEL
Editor, Modern Machine Shop

The Westinghouse Electric Corporation's switchgear distribution apparatus department is now located in its new ultra-modern plant three miles west of Bloomington, Indiana. The one-story 253,000 square foot factory area was designed specifically for the manufacture of power capacitors, lightning arresters, fuse cutouts, oil circuit reclosers and switches, coupling capacitors, and line traps. Al-

though highly conveyorized and in certain areas automated, the plant is designed for flexibility to take care of changes in product mix and changes resulting from improved product design.

In addition to the factory area, a two-story office building provides 35,000 square feet of space for sales, engineering, purchasing, industrial relations, accounting and administration, making the distribution apparatus department a self-contained unit in the corporate structure. The plant is located on a 148-acre tract and was designed with future expansion in mind.

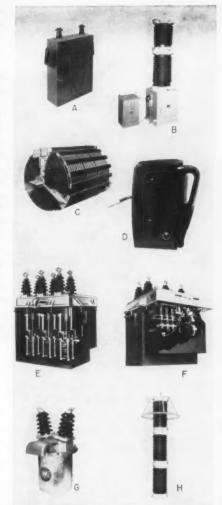
In choosing equipment for the new plant, Mr. Fred F. Herman, manager of the distribution apparatus department, stressed the need for flexibility and a move toward automation, "In planning our new plant," said Mr. Herman, "we were faced with the problem of providing a highly efficient layout using the advanced methods and equipment available to produce a large number of different products. In fact, we attempted to move toward automation, but still were confronted with the problem of maintaining flexibility. We feel that we have achieved a rather nice balance. For example, parts from common feeder sections are fed into conveyorized assembly lines, and highactivity testing has been completely automated "

#### Manufacture and Testing of Capacitors

Manufacturing and testing of capacitors is automated at the Bloomington plant. This line can be divided basically into four areas: section winding; assembly; impregnating; and testing.

Section winding consists of winding alternate layers of high quality insulating paper and sheets of aluminum foil into sections, which comprise the basic part of the capacitor. These sections are wound by operators using multiple-mandrel machines.

Assembly includes the fabrication of the cases into which the sec-



(A) 100-kvar 2400-v capacitor. (B) 115-kv coupling capacitor and potential device with remote adjusting unit. (C) 1200-ampere line trap. (D) Universal Type EU cutout for applications 2.4 through 7.8 kv. (E) 560-ampere PE recloser circuit interruption compartment. (F) 560-ampere PR recloser control compartment. (G) Line sectionalizer 115 kv, 140 amperes. (H) 182-kv SVS station-type arrester equipped with an arc-transfer device.

## "... the case is conveyed into an air conditioned room where the capacitor sections are inserted."



Fig. 1—A Struthers-Wells brake is used for blanking the capacitor case body to size, after which it goes through a degreaser and then to the Struthers-Wells tangent bender shown on right. This bender is equipped with an inert gas automatic welding head. Operator merely inserts the blank and starts the cycle to

form and seam-weld the case. The case is then moved to the machine on left. Here operator inserts the base, positions the case in the machine and presses a button. Automatically, the case and base are raised to position under the welding head where the base is then firmly welded into the case.

tions are placed. In case fabrication, a flat sheet is first sheared to exact dimensions, then formed as shown in Fig. 1 and seam-welded automatically into a rectangular case. A second machine automatically welds a base into the case. The assembly moves next to a Precision welding machine where a mounting bracket is welded to each side of the case. From this welding machine, the case is conveyed into an air-conditioned room where the capacitor sections are inserted into the case.

Large ovens have been installed for the evacuation and impregnation of the capacitors. The entire operation is controlled from panels located near the ovens. This area is also equipped with a mechanical facility which automatically

## "Human judgment and human error have been eliminated, giving a more reliable product."

handles the capacitors in and out of the ovens.

The plant is furnished with a highly automated capacitor test facility. This is a Cypak-controlled carousel-type test center. The "merry-go-round" tester has eight stations: six test stations; a load and unload station. As a capacitor is moved automatically into the first station from a conveyor, a punched card is fed into a master reader that automatically programs the tests for that particular capacitor. A sequenced conveyor carries the capacitor through six tests: capacitance, 60-cycle overpotential, d.-c. overpotential, 25-cycle overpotential, a recheck of capacitance, and finally resistance. The unit is automatically unloaded at the right station and is conveyed to the shipping area or reject conveyor.

One man operates the test center. Human judgment and human error have been eliminated, giving a more reliable product.

#### **High-Voltage Laboratory**

In the engineering laboratories, 95 percent of all the test work that is required in the research and development of new products is accomplished. For the remaining five percent of tests, the company's extensive laboratory facilities in East Pittsburgh, Pennsylvania are used.

#### **Finishing Department**

The finishing department is highlighted by an automatic bright dip machine. This particular machine was installed because of the large volume of workpieces to be cleaned both for electroplating and for internal parts for lightning arresters.

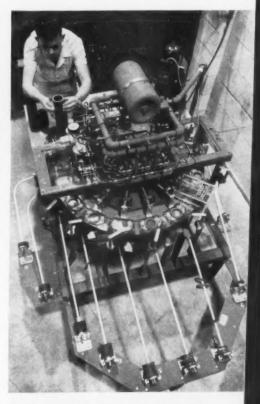


Fig. 2—Resistance spacer tester is an automatic test and inspection machine that checks and sorts lightning arrester gap resistance spacers. This nine-station machine checks the spacer for dimensions, high voltage, and flashover, and then sorts the spacers according to their particular resistance value.

## "When operating continuously, the machine will check and sort 1800 spacers per hour."

#### **Lightning Arrester Test**

Each silicon carbide lightning arrester block is given a power test to assure satisfactory performance. Two blocks are assembled into six-kv units, fitted with a series gap and energized at 6000 volts. A surge generator discharges two 10,000-ampere 12x 45-microsecond waves through the blocks.

In addition, an automatic test

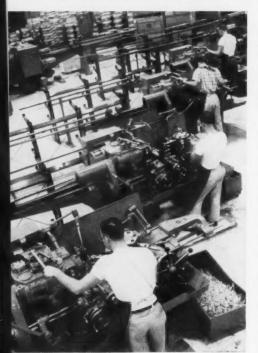


Fig. 3—View of a portion of the machine area, showing turret lathes. The machines in this area are set up for machining quality component parts for the assembly sections.

and inspection machine, as shown in Fig. 2, is installed for checking and sorting lightning arrester gap resistance spacers. This nine-station machine checks the spacers for dimensions, high-voltage flashover, and resistance. Depending on its resistance, each spacer is distributed to one of seven collecting rods. When operating continuously, the machine will check and sort 1800 spacers per hour.

The plant's seven acres of floor space include a machine shop, a portion of which is shown in Fig. 3, a fabrication shop, an engineering experimental shop, a chemical laboratory, and a number of specialized processing equipment and assembly stations.

Assembly turntables are located throughout the plant. As shown in Fig. 4 for example, an oil switch turntable is equipped with four assembly fixtures. The operation has been broken down so that the time cycle is balanced for each operation. One of the chief advantages of a turntable for assemblies is that fixtures are returned to the starting point.

In discussing the plant's modern facilities, Mr. Herman pointed out that the wide variety of machine tools and test equipment was required to produce the high quality economical products needed by the expanding electrical industry. "The modern equipment and improved tooling," concluded Mr. Herman, "combined with more precise control of the manufacturing process

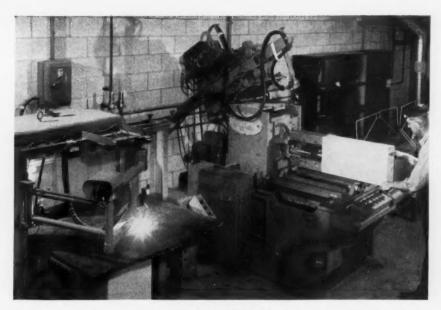


Fig. 4—View of CSO oil switch assembly turntable equipped with four assembly fixtures.

are basic factors in insuring the reliability and satisfactory performance of our products used for the distribution of electric power."

\* modern machine shop

Aids to Workshop Practice. By C. T. Bower. Published by The MacMillan Co., 60 Fifth Ave., New York 11, N. Y. 192 pages. Cloth binding, board covers. Price, \$3.75.

In this book, an attempt has been made to bring together a large number of ideas, hints, methods and gadgets that can usefully be applied in the majority of engineering workshops. Over 260 items are included, grouped into sections for easy reference. The main emphasis is on metalworking, but woodworkers, building workers and others will find much of direct interest to them.

Many of the ideas deal with better ways of using ordinary hand tools. Where machines are concerned, references are confined to the sensitive drilling machine, the small center lathe and common small power tools, including those of the popular electric drill-kit type. In addition to the items dealing with production work, there are practical tips on maintenance of tools and machines, workshop equipment and storage.

An important feature is that all new equipment described can be made easily and economically, while modifications to existing tools and machines are of the simplest. No "workshop recipes," involving the use of unobtainable materials are given, nor is any attempt made to copy commercially available tools.



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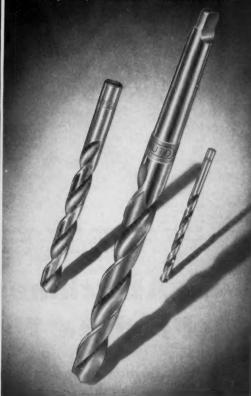
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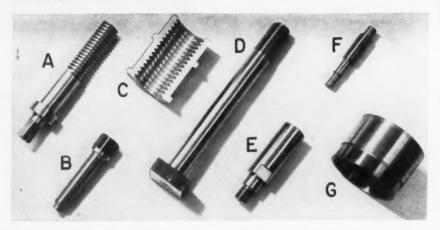


Fig. 1—Typical samples of work threaded with attachment: (A) 1 1/8-inch Acme thread; (B) 3/4-inch Standard thread; (C) 1 3/4-inch

Acme thread; (D) 1-inch Standard thread; (E) 5%-inch Standard thread; (F) 5%-inch left-hand Fine thread; (G) 3 3/4-inch Fine thread.

## Attachment Helps to Produce Threads Faster

German-made lathe attachment reduces time requirements to about one-tenth of that normally required in cutting threads on screws.

Large-scale screw-cutting operations are usually performed at best efficiency by single-purpose machines. However, in general machine shops, toolrooms, and maintenance shops, the investment thus incurred is rarely warranted. On the other hand, cutting screw threads on an engine lathe in the conventional manner usually becomes relatively uneconomical whenever even a moderate quantity of identical type parts is involved.

A German manufacturer, F. C. Weipert of Heilbronn, has developed a unique semi-automatic attachment for lathes which reduces time requirements to about one-tenth of that normally required. While the prototype was designed for the lathe built by the same manufacturer, a new model attachment is under consideration and will be exhibited at the European Machine Tool Show in Paris in 1959.

Figure 1 shows seven typical

#### "The use of the attachment does not interfere with ordinary lathe operation . . ."

samples of work, with thread diameters from 5/8 to 33/4 inches, which were produced with the attachment. Figures 2 and 3 show a plan view and front view, respectively, of a lathe equipped with the attachment. It will be noted that the design is straightforward and devoid of gadgetry. The use of the attachment does not interfere with ordinary operation; rapid change-over from turning to screw-cutting is feasible.

Any of the basic screw-thread forms can be readily produced, with cutting depths presently up to 0.22 inch. Parts can be machined internally and externally and threads may be either left or right hand.

In a typical operation, step-bystep depth feed of the tool at each cut, retraction of tool, and reversal of spindle motion follow in a continuous sequence until the thread is finished. Up to 20 cuts can be made. Upon completion of the thread, the main spindle is stopped automatically. Tapered threads, with tapers up to 3 inches per foot and up to 12 inches in length, can also be cut. In production planning, the lathe horsepower and the bulk and mass of the workpieces will indicate given limitations. Similarly, the accuracy of the product will be governed by that of the basic lathe.

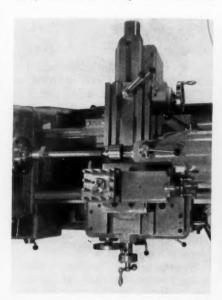


Fig. 2—Plan view of engine lathe equipped with semi-automatic screw-cutting attachment.

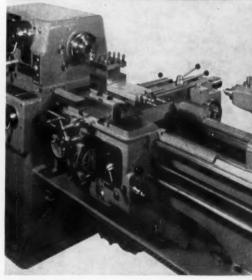


Fig. 3—Front view of same lathe equipped with semi-automatic screw-cutting attachment.



The third installment of a series of articles on heat treating procedures, the present discussion provides helpful tips for tempering or drawing steel.

By A. S. EVES

Immediately after the heating and quenching of steel comes tempering-or "drawing," as it is often called. You may have heard it said that tempering is done to reduce the hardness; but, of course, that is not generally correct. Few jobs, aside perhaps from springs, call for readings much below the "as quenched" hardness. What usually is wanted in tools. dies, or machine parts is the best possible combination of hardness and toughness. In the ears of professional heat treaters, the plea to "Make it hard as you can, but still it must be tough" has a very familiar ring.

Just why, then, this extra operation? There are two main reasons: (1) to toughen the brittle martensite crystals that were created in the process of hardening, and (2) to stop the build-up of internal stresses, due especially to "thermal" (heat) shock of quenching the steel from a high temperature.

Where strength of steel is concerned, think of it as a simple matter of arithmetic. Just as a jug will hold only so much liquid, steel can withstand only a certain total in the way of stresses and strains. That total is known as the steel's "tensile" strength.

Now in this connection it makes no difference whether the stresses are built up inside the metal, or something is done to it by way of impact or pressure from without. Usually the steel suffers both; and if the two added together reach a total that exceeds the elastic limit, you know what will happen. The steel will fracture. It is bound to.

Clearly, then, the more internal stresses we can relieve (or subtract) by some sort of heat treatment, the greater the amount of pressure that can be brought upon the steel safely while it is in service. We simply call it "tougher."

Steel is far more sensitive than it looks. That's what makes it so very versatile. You can soften it so it can be cut easily, or harden it so you can use it to cut with. You can make it stronger or weaker. Within certain limits, you even can shrink or stretch it. But always bear in mind, most anything you do to it will have some internal effect upon it—good or bad.

Next time you pick up a hardened tool or part, ask yourself: "Is this steel really as solid and peaceful as it looks?" Maybe it is; then again, maybe it isn't. No one can tell the strength of steel by merely looking at it. The truth might be a startling revelation. For instead of being strong and well able to stand up to a rugged task, it could be so loaded with internal strains as to be ready to crack open!

Happily such a thing rarely occurs. But it would happen more frequently were it not for men who realize the terrific force of those internal ("residual," is the technical word) strains and know how to cope with them.

Steel mills annual the steel they make; that relieves most of the strains caused by rolling. Machine shops often arrange for normalizing steel before the hardening operation to get rid of cold-working stresses. But some strains always remain and to these are added others during heat treatment. Too much dependence can't be put upon tempering alone to get rid of residual strains. Much can—in fact, should—be done before hardening takes place, otherwise the piling of one set of stresses upon another may cause a piece to crack before the heat treater can get it out of the quench!

Perhaps this was one of the thoughts in the minds of officers of the Metal Treating Institute when they laid down rules governing responsibility of their members. The first paragraph of that document says: "It is generally recognized that even after employing all the science known to us, and capable men with many years of training, there still are some hazards in heat treating."

Even if every piece that is heat treated were to come out of the



". . . the plea to 'Make it hard as you can but still it must be tough' has a familiar ring."

## "... the higher the drawing temperature used, the softer the steel will become."

quench whole, omit tempering and many of them would crack later on. Consequently, it would be foolish to heat and quench a die and then try to use it without giving it a "draw." It wouldn't last very long. In finish grinding, its surface would likely become full of tiny cracks. Certainly such a die would give very little service; it might even "explode" of its own accord before you got it into a press.

Everyone knows what brittleness is. But in this discussion it becomes so vital you are asked to fasten in mind this definition: "Brittleness reflects the degree of ease with which, by outside pressure or impact, an object can be

snapped in two."

Take the round figure of 100 percent to represent the tensile of a steel. Now if 85 percent of it is absorbed by inner tensions, you can readily see that no force greater than 15 percent can be exerted from outside without causing the piece to break. But—if tempering will reduce those internal stresses, say, to 40 percent, then the steel will withstand up to 60 percent, or something like four times as much shock.

There's your arithmetic! Surely it points up the purpose and importance of tempering. The more carbon a steel contains, the more important is this tempering operation. Low carbon, case-hardened steels would require it too if they did not have a soft, ductile interior core. Indeed, case-hardened jobs

sometimes *are* given a draw to provide extra toughness. Most experts feel that *any* steel which is hardened should also be drawn. For tempering can do nothing but good—unless, of course, one mistakenly uses a heat that is too high.

#### **Temperatures**

Broadly speaking, the higher the drawing temperature used, the softer the steel will become. High speed steels are an exception—they tend to go *up* a little. Also, although we need not dwell upon it here, there is a peculiar condition called "temper brittleness" that sometimes proves troublesome in the range of 450 to 750 deg. F. This is one of the big mysteries of metallurgy, and much study is being devoted to it by highly trained technicians.

Correct drawing temperatures



"No one can tell the strength of steel by looking at it. The truth may be startling . . ."

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## ". . . high speed steel should be removed from the quench when it is cool enough to be held in the hands."

hinge mainly upon: (a) the kind of steel, (b) the properties you want, and (c) the size of the piece or load.

Steel companies try to make things easier by providing in their catalogs tables stating what hardness can be expected when quenching and tempering are done at various heats. Unfortunately, those figures usually are based on experiments in which the test piece used was a 1-inch cube. Hence, they may not apply precisely when treating a thin knife blade, a heavy die block, or a piece designed with varying mass. You can, however, get some idea as to the difference in heats ordinarily used from examples like these (all made from the same plain carbon or low alloy steel): Springs are tempered at 550 to 750 deg. F. for flexibility, bolts at 800 to 1200 deg. F. for strength and toughness, and shears at 400 to 450 deg. F. for wear.

Whatever the steel, the draw temperature is always below the "critical" (hardening range) of that particular metal. In this particular respect, tempering differs from such operations as normalizing and annealing.

Tools call for a wide variety of tempering temperatures, depending on the type of steel and end use.

#### **Waste No Time!**

Actual hardening, as you were told in a previous article, takes place gradually near the end of the quenching cycle, and steel should be tempered before it becomes too cold. Nevertheless, the closer one can get to the fully cooled point (this differs with different steels) before transferring the job to the draw furnace, the better will be the product.

As one might expect, therefore, some difference of opinion exists even among the experts as to just how far it is safe to go. Old timers used to merely spit on a tool and if there was no sizzle they would remove it from the quench and temper it. No wonder they cracked many a delicate die!

Most authorities agree that high speed steel should be removed from the quench tank when it is just cool enough to be held in the bare hands. Oil hardening steels may be cooled down to the temperature of the bath (100 to 130 deg. F).



"Brittleness reflects the degree of ease with which an object can be snapped in two."

## "Far Superior to its Competition" ...

. . . states Mr. Creighton Blanchard, toolroom superintendent at New Hampshire Ball Bearings, Inc., Peterborough, New Hampshire

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"We have three grinders in our toolroom a Thompson and two competing machines. In our general toolroom grinding, especially on carbide and hard metals, we find the Thompson Type D so superior that we have recently purchased another Thompson just like it. All our precision work goes on the Thompson."



#### Compare these features

- Steel roller anti-friction slides eliminate ball creep and increase rigidity,
- 14" standard vertical capacity under 7" wheel at no extra cost with no loss in vertical capacity when using wet attachment.
- Solid support through entire length of bearing quill assures extra fine finish.
- 5 inch table movement per turn of handwheel improves quality of finish and speeds up operations.
- No backlash, anti-friction ball nuts and screws on cross feed prevent wheel from creeping away from work in shoulder grinding.
- Swing-out stop for table dog contact permits quick movement to wheel dresser.
- Immediate delivery available.

Send for descriptive literature on the new Thompson Type D Grinder.

## THE THOMPSON GRINDER CO.

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SURFACE GRINDERS

## "... tempering device should be maintained at or near correct drawing temperature while the steel is heating through."

Water or brine should be only 70 to 90 deg. F., and plain carbon steels can be fully cooled in these before tempering is begun. On the other hand, large sections may fracture if removed from the quench too soon, because of uneven heating.

At the Watertown Arsenal, some excellent work has been done on an electronic device that signals when steel has been quenched to the proper hardness, in order to reduce quench-cracking. Manufacturers now are being invited to develop this instrument commercially.

#### **Equipment for Tempering**

Tempering is done in a number of ways, mostly in draw furnaces using still air or in the speedier, more efficient type furnaces that recirculate the air. Boiling water, hot oil, molten salts, or lead also are frequently used. And for "local-

REMOVED HIM FROM THE QUENCH TOO SOON!



". . . sections may fracture if removed from quench too soon because of uneven heating."

ized draws" — that is, tempering only certain restricted areas—either an induction machine or flame device may be called into play,

Our grandfathers used a "hotplate" for all their tempering. A more modern touch was lent by an enterprising salesman of electrical appliances. He sold a couple of dozen turkey roasters in a town where he discovered tool and die shops that had no tempering equipment of any kind.

Mention has been made of drawing steel in boiling water. That being only 212 deg. F., such applications are admittedly rare. It would be risky to draw tools at such a low temperature immediately after the quench; they probably would crack while being ground.

Oil baths for tempering should not exceed 500 deg. F. Salts can be as high as 1000 deg. F. Whatever the tempering device (draw furnace or bath) it should be maintained steadily at or near the correct drawing temperature all the while the steel is heating through.

#### Time

Time—very important in tempering—will depend a good deal on:

(a) The size and shape of the part. Naturally a cube or ball will heat through uniformly in less time than a long, square bar, a cylinder, or a large flat piece.

(b) The surface condition. Shiny steel will reflect heat and thus take longer to temper. save machining **COSTS** with this versatile new tool



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"Whenever temperatures go beyond 375 deg. F., look for some change in color . . ."



"A multiple draw is never harmful . . . it may do much to insure maximum tool or die life."

(Important these days when so much steel is "bright hardened.")

(c) The size of the load. Large lots take longer to heat through. Recirculating the air speeds this up.

(d) Alloys. The more of these present, the slower will be the tempering operation.

Plain carbon steels, and low alloy steels also, should be held at temperature for at least an hour for a 1-inch section, adding another hour per inch for bigger pieces. Tool steels require at least two hours. In fact, some alloy steels are so sluggish they need *two* draws, as long as 10 hours each. High speed and high-carbon high-chromium steels should be tempered at least twice, with a full return to room temperature between each draw.

A "multiple draw" (more than one) is never harmful. Indeed, it may do much to insure maximum tool or die life.

Grinding cracks aren't always due to faculty grinding practice. The trouble may lie in overheating during the hardening operation or failure to temper enough afterward. Only an examination of the steel structure will tell the true story.

#### Discoloration

Does steel discolor when it is merely tempered? Yes, indeed. Whenever temperatures go beyond 375 deg. F., look for some change in color — beginning with a pale yellow and going through blue to full black. At 1000 deg. F. most steel not only becomes black but also begins to "scale," unless something is done to prevent it.

It is well to always remember that temper colors indicate only surface temperature of the steel.

\* modern machine shop \*

"Selling Through Industrial Distributors" is the title of a series of articles written by Louis H. Brendel of the James Thomas Chirurg Company and published by "Sales Management." These articles have now been reprinted in booklet form and copies of the booklet can be obtained at 30 cents each by writing to the American Supply and Machinery Manufacturers' Association, Inc., 2130 Keith Building, Cleveland 15, Ohio.

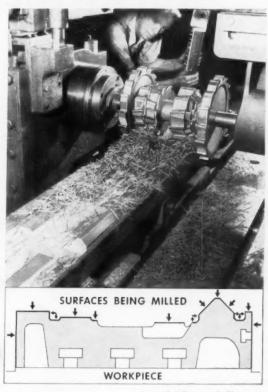
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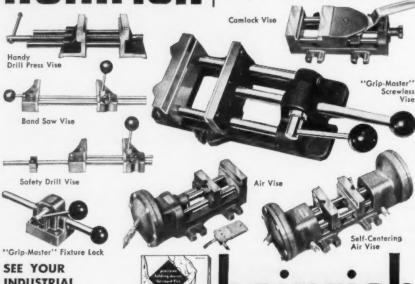
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# LARGER CAPACITY (6" WHEEL) PROFILE GRINDER

by Boyar-Schultz

#### For Heavier and Larger Work

Long known as a time saver in Tool & Die Shops, Boyar-Schultz No. 2 Profile Grinder is now available in a new larger capacity size. With its 6-inch diameter wheel capacity this new Profile Grinder will finish large dies and other similar contour grinding with the rapid efficiency so well known in the smaller wheel capacity models. The new size is made in the Single Spindle model, with a bigger table to accommodate larger and heavier work. Also available with Standard Upper Spindle.



With Dual Spindle



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more production through modernization

# more production through modernization

Techniques for increasing output with newly developed machines and tools.

## Good Clamping Saves Time

Attempting to set up work on a machine tool without suitable clamps is much like trying to tighten a nut without the proper size wrench. It can be done but it is time-consuming, awkward and, at best, never quite satisfactory. Since a worker will select the proper size wrench to turn a nut, it is logical to provide him with proper machinetool clamps. Experience has shown that frequently more time is spent in setting up a job with makeshift parts — odd bolts, pieces of scrap iron and washers—than is required for the machining operation itself. Hi-Lo Products Div., Steel City



Fig. 1—Example of time-consuming work setup using odds and ends from scrap box.

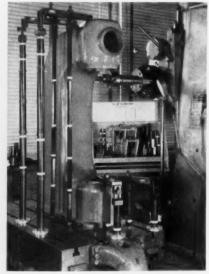


Fig. 2—Example of typical work setup using components of Hi-Lo clamping system.

Testing Machines, Inc., Detroit, stops this waste of time with a clamping system that includes all necessary clamp parts. Clamping-time savings up to 35 percent have been recorded in average setups with these clamps.

Figure 1 shows an example of a clamping setup accomplished with scrap odds and ends that results in a potential hazard to the operator, machine and tools, Compare this setup with the one involving the same workpiece shown in Fig. 2. Here is a practical comparison that clearly demonstrates the neatness, economy and safety of Hi-Lo clamps.

As parts of a "system," Hi-Lo clamps are available in handy sets of two sizes. One set will do most of the clamping jobs met in millingmachine work and the other, Fig.



Fig. 3—Boring mill size clamp set includes all necessary clamp parts in convenient cabinet.



Fig. 4—Experimental job setup shown required two men to manage the conventional strap and block arrangement while one man did the rest with self-contained Hi-Lo clamps.

 is designed to cover boring-mill operations. For special requirements, Hi-Lo clamps and components are separately available.

These clamp sets contain interchangeable components for several styles of clamp — U's, goosenecks and fingers-and necessary extensions to increase the clamp height. The maximum height that can be clamped is 49½ inches; minimum, 3/8 inch. The basic clamp consists of a U-member, an adjustable bolt assembly and an adjustable heelblock assembly. Serrations in the bolt and heel-block assemblies permit adjustments in increments of 3/16 inch, and can be loosened or locked with just a 1/4 turn of a knurled knob. Extension bolts are threaded and extension tubes for the heel-block snap together to quickly build up the needed clamp. Bottoms of bolts are threaded for use on press bolsters or they can be used with a T-nut on slotted tables and angle plates.

Components of these systems are color coded to take the guesswork



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#### More Production . . .

out of setups. The operator merely measures the work height and, with the aid of a chart, selects the exact bolt and tube extensions by color. Clamps are always parallel and there is no danger of stripping threads.

Figure 4 shows two methods of clamping work to an angle plate. Two men were required for the conventional strap and block arrangement; one man did the rest with self-contained Hi-Lo clamps.

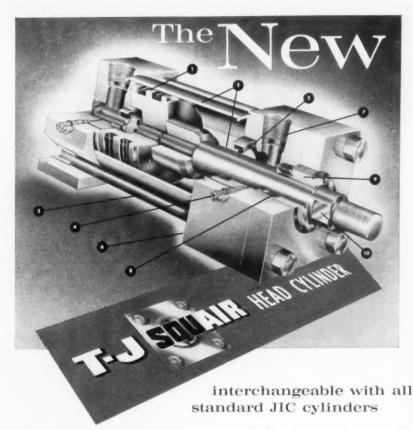
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#### Speed Lathe Prepares Aluminum Samples for Analysis

Speed lathes are widely used throughout industry for performing such secondary finishing operations as polishing, deburring, lapping, and so on, on metal and plastic parts. However, these versatile machines are frequently adapted to perform work not generally associated with secondary finishing.

An example of such an adaptation is the machine illustrated herewith. The requirement was for a high-production tool that would prepare aluminum samples for spectrographic analysis, providing a check on the purity of the metal as it was being processed. One end of a rod-shaped slug required facing and chamfering to provide the proper surface from which the arc is drawn. A Schauer Type NAIEC speed lathe, fitted with a special collet and mounted on a lathe bed



With the introduction of the ALL NEW T-J Squair Head, Tomkins-Johnson now offers industry the most complete design range of air and hydraulic cylinders. Presently available in bore diameters from 1% to 8 inches, the T-J Squair Head is an interchange.

able cylinder which produces maximum force and efficiency, with minimum pressures ... and is also adaptable to the use of low pressure oil as the working medium. Write today to Tomkins-Johnson, Jackson, Michigan, for Bulletin #SQ 10-58 and complete details.

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## FURNACES

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More Production . . .

having a carriage and hand leveroperated cross slide with a turret to carry the chamfering and facing tools, provided a fast, economical means for accomplishing the required work.

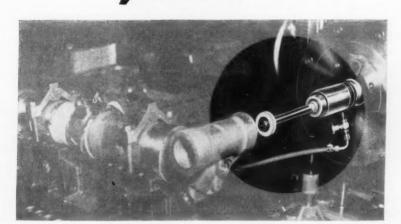
Control of the lathe is by a footoperated treadle, leaving the operator's hands free to load the work. The motor operates continuously, and is coupled to the collet spindle through a magnetically-operated clutch. A large disc-type brake, also magnetically operated, is applied as soon as the clutch is deenergized. Pressure on the foot treadle closes the collet and energizes the clutch, thereby causing the spindle to revolve.

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Operator uses specially adapted speed lathe to prepare aluminum samples for analysis.

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January, 1959

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# Honing Cylinder Bores to Close Tolerances

The bores of two different cast iron V-8 cylinder blocks for truck motors are honed on the BarnesdriL Model No. 320 standard vertical type honing machines

shown in the accompanying illustration. Bore sizes are 3.625 inches I.D. by 5-11/16 inches long and 3.875 inches I.D. by 6½ inches long in respective parts—both semiblind end bores. Two machines are placed side by side and connected by a synchronized automatic trunnion and transfer type fixture, also of BarnesdriL design. The complete machining installation is fully auto-

matic and equipped with electrical interlocks and probe for maximum safety in set-up and operation.

While the setup is in operation, the operator is required only to replace worn out honing stones as directed by signal lights on the control panel which indicate when each tool requires new honing stones, and also to move the parts manually on the conveyor approximately one part length into the preloading station. A sensing device in the preloading station detects the presence of a part and starts





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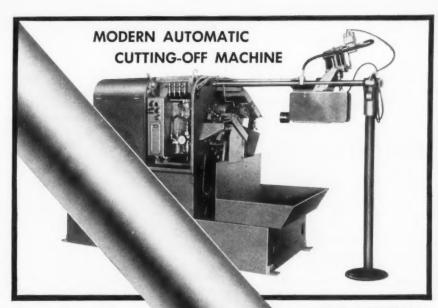


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Adjustable



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the automatic work cycle of transfer, load, clamp, trunnion, hone, return trunnion and unclamp.

The cylinder block placed in the preloading Station 1 is moved into the fixture at Station 2 by a transfer bar. The part is located in the fixture by pins engaging dowel holes in the pan face. The positioned part is then hydraulically clamped and rotated to place the left bank of bores vertically in the honing position. Simultaneously, a part in Station 5 has been rotated in the opposite direction to hone the right bank of bores.

During normal operation, there are six blocks in the machine—one in the preload Station 1, one in each fixture (Stations 2 and 5), one in each idle Station 3 and 4



Two-machine setup used to precision hone the bores of cylinder blocks for truck motors.



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Drill Bushings. The walls,
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#### More Production . . .

between the fixtures and one in the eject Station 6. To clear the machine of parts, the operator presses the manual button on the control panel and directs all machine functions by selecting the proper sequence control.

Pneumatic hone expansion and proper stone selection facilitate the removal of 0.004 to 0.005 inch stock from the bores in less than 30 seconds. Prior to honing, the cylinder blocks are reamed with an eight-blade cutting tool leaving the 0.004 to 0.005 inch stock to be removed in the honing operation. Production of both blocks is 85 parts per hour gross and 68 parts per hour at 80 percent efficiency. For more data circle 3 on Postpaid Card

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#### Multiple Machining of **Brake Drum Castings**

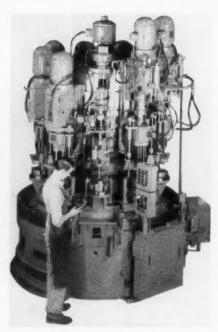
The Kingsbury multi-unit automatic with center column shown herewith performs 52 operations on brake drum castings. Seven

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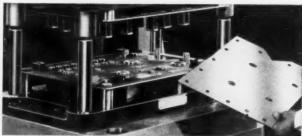
This multi-unit automatic is designed to perform 52 operations on brake drum castings of the type shown being held by operator.

units with multi-spindle heads drill, countersink, and ream 12 holes at a gross production rate of 175 parts per hour.

A 60-inch index table holds nine diaphragm chucks with power clamping and automatic unclamping. Four units have four-spindle auxiliary heads and drill eight holes in one step and four deeper holes in two steps. Three units have 12-spindle heads with oil mist lubrication from the generator at the right of the base. They countersink, rough ream and finish ream 12 holes. Before the reaming operation, an air-operated probe checks all holes for depth.

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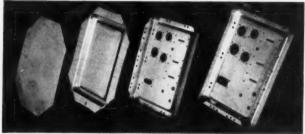
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January, 1959

modern machine shop

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### ideas from readers

Several time-saving ideas and suggestions for the man in the machine shop.

# Surface Grinding Fixture for Non-Ferrous Parts

By ROGER ISETTS

The accompanying sketch shows an economical-to-make yet high production fixture for use in the surface grinding of small brass spacers, as well as other shapes and sizes of non-ferrous parts. The fixture consists of a flat rectangular steel plate, A, which is milled out to accommodate the workpieces, B. The thickness of the plate is slightly less than the finished size of the workpiece. A hole is drilled and tapped in one end of the

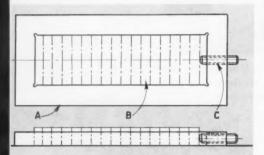
fixture to accommodate a clamping screw, C. The fixture is held on the grinding machine table by means of a magnetic chuck and, since the workpieces are firmly confined in the fixture, work slippage is completely eliminated.

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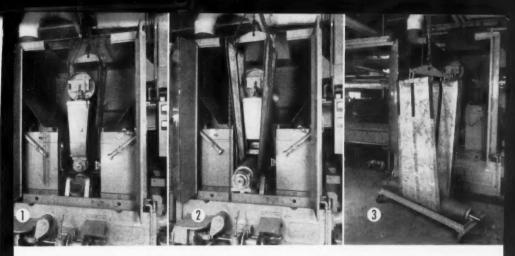
#### Canvas Sling Simplifies Handling of Heavy Machine Rolls

By IRA S. ROBERTS

A simple method of handling heavy machine rolls, developed by abrasives engineers of Behr-Manning Co., Troy, N. Y., not only reduces man-hours by at least 80 percent, but also cuts injury hazard to the vanishing point. Developed for removing worn contact or billy rolls up to 60 inches in length from large grinders which use coated abrasive belts, the method is widely applicable in many plants. Such rolls often weight from 700 to 1000 lb.; this weight, plus their awkward length and the necessity of working in close quarters, has made the



Sketch of simple-to-make fixture for use in surface grinding of non-ferrous parts.



(1) Here the hoist and sling are in place, the bearing cap has been dropped out of the way and the contact roll is ready to be lifted out of the machine. Note the hinged "trap door" cut in the roof of the machine housing. (2)

Securely cradled, the roll is shown being withdrawn from the grinder. (3) Angle iron, reinforcing plates, industrial casters and a pair of cupped bearing rests produced a safe and durable dolly, as illustrated herewith.

change-over an awkward and difficult job.

The improved method starts with cutting and hinging a section in the top of the machine housing in order to allow access for the sling. Next, a monorail and a one-ton hoist are mounted above and along the center line of the machine, with the monorail extending six feet out from the machine housing. A steel voke or spreader bar an inch or two wider than the idler roll diameter is now made, along with a sling of heavy-duty canvas. Each end of the sling is hooked to the steel yoke to form a cradle for the heavy roll. This sling should be reinforced with webbing sewn over steel bars at each end.

With the sling in place under the roll, the latter is disconnected and hoisted slightly to clear the ends, afterwhich it is pulled forward out of the machine and lowered to a dolly—preferably low to prevent

tipping. Such a sling cradles the roll safely, thereby preventing damage to rubber or other surfaces, and also allows for easy removal of journal bearings as well as for thorough lubrication of bearing faces at both ends.

\* modern machine shop \*

#### Milling Machine Setup for Lap Finishing Form Tools

By H. J. GERBER

In our shop it is often necessary to precision finish circular concavities in various types of form tools after they have been heat treated. As we do not have specialized form grinding equipment in our shop, it is necessary to make improvised setups on standard machine tools. One setup which has been successful and involves but

#### ideas from readers . . .



Lap set up in milling machine is used for finishing precision radius on form tool.

small cost to make is illustrated herewith.

A standard copper sleeve hole lap is turned down to the required radius and installed in the spindle socket of a horizontal milling machine. While the lap is rotating, the saddle of the miller is moved back and forth by hand feed. Pressure between the lap and work is maintained by feeding the knee of the machine upward periodically.

A liberal supply of medium grade lapping compound is applied for roughing out the work. When ready for the finish cut, the lap is washed clean with kerosene and used without any additional compound but with a liberal supply of oil for the fine finish usually necessary on this type of form tool.

An advantage of such a milling machine setup is that accurate location between a number of cancavities may be quickly and easily effected by dial feeding the table from one position to another one.

# Shuregrip BORING BARS



#### DOUBLE END 30° & 90°

7-A Number 1-A 2-A 3-A 4-A 11/4 3/a 7 1/2 11/2 Bar. Dia. In 5/8 3/4 1 Length In 9 11 13 18 23 1.95 2.10 2.95 3.25 4.55 10.75 1/2 Sq. Cutter In Price Each 4.55 10.75 20.80 SINGLE END 30° & 90°

When Ordering-State Angle Required 1-B 2-B 3-B Number 4-B 5-B 6-B 3/4 3/4 Bar, Dia, In 3/a 1/2 5/8 5/a 7 Length In 3 A 5 8 1.25 1.35 2.20 2.50 2.60 2.80 Cutter In Price Each

# Adjustable Boring Bar holders available take bars from $3/e^{\prime\prime}$ up to $11/2^{\prime\prime}$ diameter. T-Blocks made to fit any lathe. Price list on request.

WRITE FOR PRICE ON LARGER BARS

#### BREAK OFF ON SCORE, AS REQUIRED

### J. E. FREYMAN & SONS, INC.

3627 KESWICK RD.

BALTIMORE 11, MD.

For more data circle 409 on Postpaid Card

# REPCO Time-Saving Tools

# ADJUSTABLE V-BLOCK DRILL JIG

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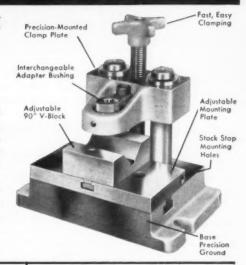
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#### Saves Set-Up Time— Increases Output

Here is a versatile and accurate V-Block that makes center and off-center drilling, tapping, and reaming easy and precise. Four-way V-block adjustment simplifies handling a wide range of work. Fast, easy positioning and clamping speed production. A centering locator plug and T-slots in the mounting surface plates assure fast, easy, on-center adjustment. Drill capacity #80 to %" diameter. Handles stock from ½" to 2" diameter.



### TRUE-CENTER ADJUSTABLE TOOL HOLDER



The REPCO Adjustable Holder is a precision-built tool, having two-piece construction which provides fast adjustment of the main body to compensate for as much as ½2 machine misalignment. Cuts down on tool wear, breakage, and scrap.



Save time with this versatile 2-Piece Machine Vise Set. Use as general-purpose vise, angle-block, ar separate clamping device. Opening limited only to length of machine base. Light, accurate, rigid, Two sizes: 6" and 8".

#### CHUCK JAW TRUING-RING SET



This Ring Set saves time, cuts cost of boring jaws. With correct diameter rings at hand, you gain hours of productive time. Plated rings range from 1° to 4° by ½...
increments. Handy pegtype rack keeps rings in place.

#### COMBINATION LIVE-CENTER SET





Write for complete information—Exclusive agent territories open.

# REPCO

#### ROCKFORD ENGINEERED PRODUCTS CO.

23rd Ave. & 20th St., Rockford, Illinois

For more data circle 410 on Postpaid Card





### free literature

Use Postpaid Cards opposite page 32 and inside back cover for requesting free copies of literature listed below.

Machine Design

The James F. Lincoln Arc Welding Foundation, Post Office Box 3035, Cleveland 17, Ohio. This booklet gives complete details on the \$50,000 Machine Design Award Program, which closes July 20th, 1959.

For more data circle 5 on Postpaid Card

**Band Saws** 

Johnson Manufacturing Corp., 1012 Barnes St., Albion, Mich. This catalog gives descriptions, illustrations, specifications and applications of the comppany's line of metal cutting band sawing machines.

For more data circle 6 on Postpaid Card

Cylinders

150

The Tomkins-Johnson Co., Jackson, Mich. Bulletin No. SQ 10-58 is a six page, two color bulletin which describes and gives complete technical data concerning the T-J Squair Head interchangeable cylinder.

For more data circle 7 on Postpaid Card

**Tubing End Seals** 

Flick-Reedy Corp., Miller Fluid Power Division, 2024 North Hawthorne, Melrose Park, Ill. This paper contains a frank appraisal and comparison of the various types of hydraulic cylinder tubing end seals.

For more data circle 8 on Postpaid Card

Steels and Steel Products

Jones and Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa. This booklet, entitled "The Exciting New J and L," illustrates all major projects, describes many of the new products, facilities and services of the company. For more data circle 9 on Postpaid Card

Flexible Shaft Machines

Stow Manufacturing Co., 1 Shear St., Binghamton, N. Y. Catalog No. 59 gives details on standard flexible shafts and flexible shaft machines.

For more data circle 10 on Postpaid Card

**Cutting and Bending Machine** 

Wharton Unitools, Valley Stream, Long Island, N. Y. This flyer describes and illustrates the Tiger Cob Universal Thread Cutting and Pipe Bending Machine. Accessories and specifications are also included.

For more data circle 11 on Postpaid Card

Roller Stock Pusher

Applied Mechanics Corp., 528 Fourth St., Northwest, Grand Rapids, Mich. Flyer describes and illustrates the Amcor Roller Stock Pusher, which has been designed for positive stock alignment in progressive dies.

For more data circle 12 on Postpaid Card

**Engineering Bulletin** 

Metallizing Engineering Co., Inc., 1177 Prospect Ave., Westbury, Long Island, N. Y. A basic engineering data bulletin on wire and powder sprayed coatings of metals and ceramics. It is known as Bulletin 136A.

For more data circle 13 on Postpaid Card

**Spray Decorating Equipment** 

Conforming Matrix Corp., 396 Toledo Factories Building, Toledo 2, Ohio. A complete data file on spray decorating equipment, which includes electro-formed nickel and copper masks, mechanical and air operated clamps and pressure fixtures, automatic mask washers and automatic spray decorating machine.

For more data circle 14 on Postpaid Card

**Marking Machines** 

The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. Catalog No. 9 illustrates, describes and gives general specifications of the latest models of automatic, semi-automatic and hand operated rotary marking machines.

For more data circle 15 on Postpaid Card

**Press Room Equipment** 

Cooper Weymouth, Inc., 600 Honeyspot Rd., Stratford, Conn. Catalog No. 58 describes and illustrates air operated slide feeds, mechanical slide feeds, part straighteners, stock straighteners, combination cradle straighteners, wire

straighteners, stock reels, scrap choppers and press safety guards.

For more data circle 16 on Postpaid Card

Air-Hydraulic Unit The Electro-Mechano Co., 265 East Erie St., Milwaukee 2, Wis. This flyer describes and illustrates a new airhydraulic unit, which has been designed for the automation of millers, lathes, drill presses, packaging machinery, bottling machinery, assembly operations and so on. For more data circle 17 on Postpaid Card

#### Presses

Clearing Machine Corp., Division of U. S. Industries, Inc., 6799 West 65th St., Chicago, Ill. This bulletin describes and illustrates the line of Torc-Pac O.B.I. Presses, which are available in 22, 32 and 45 ton capacities. The bulletin describes in detail the numerous features of this line of presses.

For more data circle 18 on Postpaid Card **Hex-Socket Screws** 

The Allen Manufacturing Co., Bloomfield, Conn. This 40 page bulletin (G-57) contains detailed information on the company's hex-socket set screws, socket head cap screws, hex-socket flat head cap screws, "Tru-Round" pipe plugs, hex-socket shoulder screws, Allenuts, hex keys and dowel pins.

For more data circle 19 on Postpaid Card

Storage Racks

Palmer-Shile Co., 16022 Fullerton, Detroit 27, Mich. Folder describes the P-S 58 Series of low cost storage racks. For more data circle 20 on Postpaid Card



### TAP with the quadtapper



into drilling position by indexing the

turret. A real time and cost saver!

Send for complete details of both QUADRILL and QUAD-TAPPER construction and operation features. By attaching the QUAD-TAPPER to any of the four spindle assemblies of the QUADRILL, you can drill and tap almost simultaneously. Affords accurate tapping at high speeds. DESIGNED FOR PRODUCTION COST CUTTING

#### CHICAGO QUADRILL

Company

1854 BUSSE HIGHWAY . DES PLAINES, ILL.

For more data circle 411 on Postpaid Card

**Packaging Machines** 

Sundstrand Machine Tool Co., American Broach Division, Ann Arbor, Mich. This bulletin describes and illustrates the newly acquired Packmaster Packaging Machines that pack, print and count packages automatically.

For more data circle 21 on Postpaid Card

No. 855P contains 12 pages which describe and illustrate the Alpha line of high speed, two point, underdrive stamping presses. Roll feeds and scrap cutter are an integral part of the design with the drive mechanism enclosed within the steel frame.

For more data circle 22 on Postpaid Card

**Underdrive Stamping Presses** 

Alpha Press and Machine, Inc., 9281 Freeland Ave., Detroit 28, Mich. Bulletin Diamond Tools and Wheels

A. I. T. Diamond Tool Co., 8207 North Kimball Ave., Skokie, Ill. This brochure

gives the technical outline on the correct applications of resin and metal bonded (Al-Aloid Bond) diamond impregnated wheels. The combination of these two bonds can cover jobs required by industries which use diamond impregnated wheels. For more data circle 23 on Postpaid Card

**Mounted Wheels** 

Chicago Wheel and Manufactur-ing Co., 1101 West Monroe St., Chicago, Ill. Bulletin No. 1505 contains full size illustrations of mounted wheels, shown with exact dimensions and prices. There are 200 standard sizes and 86 standard shapes available in a variety of bonds, including vitrified, resinoid and soft rubber polishing. For more data circle 24 on Postpaid Card

Bending Machines Pedrick Tool and Machine Co., Inc., Department 5, 3640 North Lawrence St., Philadelphia 40, Pa. Bulletin Philadelphia No. 58 pictures and



For more data circle 412 on Postpaid Card

152 modern machine shop January, 1959

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describes a complete line of compression process production bending machines and accessories and, in addition, gives much useful information on general

bending theory and practice.
For more data circle 25 no Postpaid Card

Adjustable Push Broaches

The Baj Tool Co., 19751 St. Clair Ave., Cleveland 19, Ohio. Bulletin 20 describes and illustrates Glenny Adjustable Push Broaches for precision keyways.

For more data circle 26 on Postpaid Card

Training Service Manual

Lincoln Extension Institute, 1401 West 75th St., Cleveland 2, Ohio. The 1959 edition of "Getting Ahead in Industry" is a 48 page manual detailing organized training service in industrial supervision and executive management.

For more data circle 27 on Postpaid Card

**Taper Correcting Device** 

Cincinnati Grinders, Inc., Cincinnati 9, Ohio. Publication No. G-687 provides complete information on the Gage-Line, which is an electronic taper correcting

For more data circle 28 on Postpaid Card

Microhardness Testers

Newage Industries, Inc., Department MMS, 222 York Rd., Jenkintown, Pa. Flyer describes and illustrates the Newage Microhardness Tester, that permits direct, accurate readings, corresponding to Vickers, within 15 seconds by measuring resistance hydrostatically and which eliminates a microscope, conversion charts and complicated tables.

For more data circle 29 on Postpaid Card

Stock Storage Racks

Jarke Manufacturing Co., 6333 West Howard St., Chicago 31, Ill. Bulletin de-scribes and illustrates the Mini-Module prefabricated stock storage rack, which is a flexible system for permanent or temporary storage.

For more data circle 30 on Postpaid Card

Magnetic Pads

Miller Pattern and Manufacturing Co., 3320 Bay Rd., Saginaw, Mich. This flyer describes and illustrates Magnapads, which consist of a copper strip and attached magnates. It fits between the lathe jaws and the stock.

For more data circle 31 on Postpaid Card

# People work better when they SEE BETTER®

### 3-D Girl at SKF

Magni-Focuser multiplies the power of this girl's eyes as she inspects a tiny ball bearing at SKF Industries, Inc.



#### MAGNI-FOCUSER'S

matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

# MAGNI-FOCUSE

SPEEDS PRODUCTION With Third Dimensional (3-D) Vision Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeding aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

Send for descriptive folder

Edroy Products Co.

Dept. P. 480 Lexington Ave. New York 17. N. Y.

For more data circle 413 on Postpaid Card

free literature . . . (For free literature use postpaid card opposite inside back cover)

#### Gears

Illinois Gear and Machine Co., 2108 North Natchez Ave., Chicago 35, Ill. Illustrated brochure on the company's products, plant facilities, quality control facili-ties, as well as information on capacities, types, processes, materials, heat treatments and equipment.

For more data circle 32 on Postpaid Card

#### Press Brake

Niagara Machine and Tool Works, Buffalo 11, N. Y. Bulletin 90 Supplement

General

Purpose grinders, 12", 14" and 18"

2, 3 and

5 HP.

Vide range Precision

grinders with internal-

external grinding heads. 1/4, 1/2, 1, 2, 3, 5, 71/2, and 10 HP.

Bench grinders, 8" to 12", 3/4, 1 and 2 HP.

presents this company's 15 ton power press brake. Complete design and operating features, as well as specifications, are concisely presented in two pages of this bulletin.

For more data circle 33 on Postpaid Card

#### **Driver for Screws and Nuts**

Dixon Automatic Tool, Inc., 2314 Twenty-Third Ave., Rockford, Ill. A four page descriptive bulletin (No. SD-B1) on the Dixon Driver, which has been designed for screws and nuts. It shows various

models of this Auto-Torque Driver, how parts are handled by the feeder and, in addition, it gives specifications.

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#### **ONE** eye on QUALITY ONE eye on COST... THAT'S Hisev

# OF CINCINNATI!

For more than 50 years a leader in LOW cost grinding and buffing machines, the Hisey line continues to give you the same quality and accuracy that has made "Hisey of Cincinnati" famous the world over.

Send for the complete information today! Featured nationwide by leading industrial distributors.



350 Mt. Hope Ave. Cincinnati 4, Ohio

For more data circle 414 on Postpaid Card

#### Jig and Fixture **Component Parts**

Carr Lane Manufacturing Co., 4200 Krause Court, St. Louis 19, Mo. This 25 page catalog features an illustrated non-scale listing of component parts of jigs and fixtures.

For more data circle 35 on Postpaid Card

#### **Drilling** and **Tapping Heads**

Wisconsin Drill Head Co., 4938 North 124th St., Butler, Wis. This folder describes and illustrates rotating heads, which have been designed for automatic chucking machines. Specifications o f both the drilling and the tapping heads are included in this interesting bulletin.

For more data circle 36 on Postpaid Card

modern machine shop

Belt-Drive

Buffers

and

**Polishers** 

2, 3 and 5 HP.

#### O.B.I. Presses

Sales Service Manufacturing Co., 2365 University Ave., St. Paul 14, Minn. Catalog No. 958 illustrates and describes the complete line of 2 to 85 ton Press-Rite O.B.I. Presses with full specifications, detailed description of outstanding features and of optional equipment.

For more data circle 37 on Postpaid Card

log on socket screw products includes information on Setko socket shoulder screws, flat heads, button heads and dowel pins. Also shown is the expanded line of Setko Perfect-Hole cold forged socket head cap screws. A feature of Catalog No. 23 is the inclusion of the self-locking set screw selector chart. For more data circle 38 on Postpaid Card

O.B.I. Presses

The Federal Press Co., 804 Division St., Elkhart, Ind. Two color catalog features the firm's line of newly designed open

#### Socket Screw Products

Set Screw and Manufacturing Co., 152 Main St., Bartlett, Ill. This 28 page cata-

# WILSON "ROCKWELL"

THE WORLD'S STANDARD OF HARDNESS TESTING ACCURACY

# A Complete Library of Helpful Information on Hardness Testing



No matter what hardness testing requirements you have, there's a WILSON instrument to do the job for you. WILSON's library of hardness testing information has data on applications—the principles of the "ROCKWELL" tester—operation—accessories—conversion tables—the full line of WILSON instruments.

Write for complete details on specific machines. Just check the bulletins of particular interest to you.

CITY	STATE
ADDRESS	
NAME	COMPANY
DH-326—"ROCKWELL" Superficial Hardness Testers, for extremely shallow indentations.	DH-328—TUKON Tester, for precision MICRO and MACRO testing.
DH-325—WILSON "ROCKWELL" Hardness Testers, for most hardness testing requirements.	DH-327—Special "ROCKWELL" Testers, for unusual applications, including Automatic and Semi-Automatic models.



MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE

230-G Park Avenue, New York 17, N.Y.

For more data circle 415 on Postpaid Card

back inclinable presses. Illustrations are presented of 22 models. Each is available with either a gear or flywheel drive. In addition, the catalog presents completely new specifications on all models, as well as a graphic description of all Federal engineering features.

For more data circle 39 on Postpaid Card

Waldes Kohinoor, Inc., 47-16 Austel

**Retaining Rings** 

No. RR 10-58 contains 24 pages of descriptions and illustrations of all currently available Waldes Truarc retaining rings, pliers and various types of accessory tools.

For more data circle 40 on Postpaid Card

Workholding Fixtures

Universal Vise and Tool Co., Parma, Mich. This 24 page catalog (9158 CJ) describes a full line of machine vises, rotary tables, adjustable angle plates,

standard setup fixtures and the Universal Clamp-N-Jack Setup System designed for all types of machine tools. u

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For more data circle 41 on Postpaid Card

#### Tool Steel

Uddeholm Company of America, 155 East 44th St., New York 17, N. Y. This chart lists the comparable brand names of thirteen of the major tool steel suppliers. It classifies, according to general type and SAE number, sixteen different grades of tool steel.

For more data circle 42 on Postpaid Card

#### **Hydraulic Presses**

Hannifin Co., Department 166, 501 South Wolf Rd., Des Plaines, Ill. This 24 page, illustrated Bulletin 130-G covers the features, specifications and dimensions for the standard Hannifin press line of open gap and column type high speed hydraulic presses, along with a section containing engineering formulae



156

useful in selecting the proper press for a specific application.

For more data circle 43 on Postpaid Card

#### Steel Bars

La Salle Steel Co., Post Office Box 6800-A, Chicago 80, Ill. An 11 by 17 inch wall chart lists all AISI grades of cold finished steel bars. Five page comparison chart lists 241 various grades of steel bars.

For more data circle 44 on Postpaid Card

#### **Cemented Carbides**

Allegheny Ludlum Steel Corp., Department MS-12, Oliver Building, Pittsburgh 22, Pa. This 32 page booklet is entitled "Cemented Carbides for Industry" and includes a simplified pricing system and information on CA-604, which is a new Carmet cutting grade.

For more data circle 45 on Postpaid Card

Air Cylinders

Lynair, Inc., 3100 East Michigan, Jackson, Mich. Catalog provides complete specifications of the company's square air, airdraulic, air booster and low pressure hydraulic cylinders. Engineering and ordering data are also included in this brochure.

For more data circle 46 on Postpaid Card

Notching Units

Wales-Strippit, Inc., 207 South Buell Rd., Akron, N. Y. Catalog N shows a wide variety of notching operations which can be readily set up in stamping presses and press brakes in unlimited patterns for short job runs or long production

For more data circle 47 on Postpaid Card

#### **Conversion Chart**

Engis Equipment Co., 431 South Dearborn St., Chicago 5, Ill. This conversion chart has been designed for the engineer who must make calculations to the sixth decimal point.

For more data circle 48 on Postpaid Card

**Gray Iron Castings** 

The Carborundum Co., Electro Minerals Division, Niagara Falls, N. Y. This 16 page booklet concerns Ferrocarbo Briquettes and the effects on microstructure and the machinability of gray iron castings.

For more data circle 49 on Postpaid Card



For more data circle 417 on Postpaid Card



EISLER ENGINEERING CO., INC. 734 S. 13TH ST., NEWARK 3, N. J.

For more data circle 418 on Postpaid Card

### How to ENGRAVE **PANELS and SIGNS** to 30" WIDE by any length

Use the LOW COST precision built Preis-Panto 20-4 Engraving Machine. It does the work of larger machines, costing much more. .............

- Pantograph is graduated with reductions from 1:1 to 100:1 and will reduce to any size to infinity.
- · Pantograph and spindle link joints equipped with precision ball bearings throughout.
- · Precision ball bearing cutter spindle.
- Collet capacity from 1/10" to 1/4" and standard taper shank cutters.
- Six spindle speeds-5,000 to 14,000 rpm. · All feed-screw dials graduated in .001".

TRADE MARK



Write for complete details and prices. For immediate attention write directly to manufacturer below. Ask for nearest representative.

H. P. PREIS ENGRAVING MACHINE CO. Hillside, N. J. 657 U.S. Route 22, For more data circle 419 on Postpaid Card Safety Booklet

Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio. This 24 page informative booklet is entitled "Safety Recommendations for Grinding Wheel Operation."

For more data circle 50 on Postpaid Card

describes and illustrates the Rusnok No. 120 Mill Head that features infinite speed and feed.

For more data circle 51 on Postpaid Card

Carriers, Cranes and Tractors

The Cleveland Crane and Engineering Co., Cleveland Tramrail Division, 6412 East 282nd St., Wickliffe, Ohio. A revised issue of Cleveland Tramrail Engineering and Application Booklet, No. 2008-N.

> contains detailed studies of track design, peening and stresses. Also covered are various types of carriers, cranes, tractors, track switches, buckets, grabs and, also, electrification.

3

For more data circle 52 on Postpaid Card

#### Cylindrical Grinder

The Landis Tool
Co., Waynesboro,
Pa. Four page
Bulletin CD-58 describes the Landis
10 Inch Type DCH
and 14 Inch Type
LDCH Plain Cylindrical Grinders.
The bulletin shows
a typical example
of how automation
can be applied to
this grinder.

For more data circle 53 on Postpaid Card

#### Air Vises

Heinrich Tools, Inc., Department 118-M, Racine, Wis. This four page, two color brochure describes a complete air vise line for automatic, self - centering operations within a tolerance of 0.001 with holding power up to 4,000 pounds at 100 pounds per square inch.

For more data circle 54 on Postpaid Card

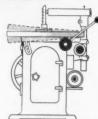
#### Milling Head

Rusnok Tool Works, 4840 West North Ave., Chicago 39, Ill. Four page bulletin

HIGH-SPEED LOW-COST KEYWAYS

#### WITH DAVIS KEYSEATERS!

You can cut accurate, low-cost internal keyways at minimum cost with Davis Keyseaters. Here's why: (1) operation is designed for production speed; (2) machine sets up easily, does not require skilled operator; (3) maximum concentricity of the keyway in each bore assured; (4) Built in 2 sizes. Keyways range from \( \frac{1}{16}\) "to 1". High speed steel cutters stocked in all sizes; (5) the best keyseater of its type, yet inexpensive! Write now for FREE DETAILED LITERATURE!



Tilting table sets easily for tapered keyways up to 3" per foot.

DAVIS KEYSEATER COMPANY

DIVISION OF Hansford MANUFACTURING CORPORATION
1239K University Ave., Rochester 7, New York
For more data circle 420 on Postpaid Card

158

#### **Electrodes**

The Lincoln Electric Co., Department 3522, Cleveland, Ohio. Bulletin 7000.2 is a 20 page catalog and procedure guide for Lincoln manual arc welding electrodes for hard-surfacing and for welding stainless steels, non-ferrous metals and cast iron.

For more data circle 55 on Postpaid Card

#### **Precision Turret Lathe**

The Challenge Machinery Co., Grand Haven, Mich. Publication No. 865 completely describes a small, semi-automatic precision turret lathe which has been designed for either short runs or secondary operations.

For more data circle 56 on Postpaid Card

#### **Turret Lathes**

Gisholt Machine Co., Madison 10, Wis. Form 1179-A describes and illustrates the Fastermatic Automatic Chucking Turret Lathe. The catalog fully explains basic machine principles whereby speeds, feeds and machine functions can be preselected electrically.

For more data circle 57 on Postpaid Card



#### SHARPENS SAWS Automatically, In Gangs

Just think of itl 100 26 gauge saws sharpened at one time. Takes saws up to  $5\frac{1}{2}$ " dia, and  $1\frac{3}{4}$ " thick. Saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

WRITE FOR CIRCULAR 35T

The WARDWELL MFG. CO.
3803 RIDGE RD. CLEVELAND, O.

For more data circle 421 on Postpaid Card January, 1959

# For Small Precision Work You Need The . . .

# LINLEY JIG BORER

The Linley will meet the most exacting requirements and save you money by releasing your larger beress for heavier loss. It's a precision tool . . . Versatile and flexible: easy to set up and fast operating. Write to receive complete information on the many improvements that are now standard.

Table Size: 7" x 171/2"
Table Travel: 61/2" x 10"



#### LINLEY BROTHERS CO.

661 State St. Ext., Bridgeport 1, Conn.

For more data circle 422 on Postpaid Card



For more data circle 423 on Postpaid Card modern machine shop 159

# news of the industry

Appointments . . . officers . . . new plants and expansions . . . services

Edited by L. L. BALDHOFF

# PRECISION TWIST DRILL EXPANDS SALES AND WAREHOUSE FACILITIES

In another move toward expansion, the Precision Twist Drill and Machine Co., Crystal Lake, Ill., has announced the establishment of fourteen additional sales offices and warehouse facilities throughout the country.

Precision recently expanded its line to include carbide tools and now features a complete line of high speed, carbon and carbide drills, reamers and end mills. For many years Precision has specialized in small drills, down to 0.0059 inch in diameter.

\* modern machine shop

#### BUFFALO FORGE ELECTS NEW PRESIDENT

At a recent meeting of the board of directors of Buffalo Forge Co., Buffalo, N. Y., Edgar F. Wendt retired as president. After 29 years in that capacity and 47 years with the company, Mr. Wendt will continue an active interest as a director.

To succeed him, the directors elected William R. Heath as president. Mr. Heath has been with the company for 36 years, starting in engineering. He became chief engineer in 1948, director of manufacturing in 1951, vice president in 1953 and he was named executive vice president in 1955.

#### W. O. BARNES NAMES NEW PRESIDENT

The W. O. Barnes Co., Inc., Detroit. Mich., manufacturer of hack and band saw blades, has announced the appointment of Vernon H. Olson as president.

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Mr. Olson has been vice president in charge of sales for the company since 1948. He succeeds the late president, J. Harry Flavell.

\* modern machine shop

# CINCINNATI MILLING MACHINE ELECTS OFFICERS

At the conclusion of the meeting of the board of directors which was held recently, Walter W. Tangeman, having completed fifty years of service with The Cincinnati Milling Machine Co., Cincinnati, Ohio, retired as chairman of the board. His great contribution to the company's growth and progress was gratefully acknowledged by the directors and officers at a dinner given in his honor. He will continue as a director.

Frederick V. Geier, president since 1934, was elected chairman with the responsibilities of chief executive officer. Swan E. Bergstrom, who joined the company in 1927 and has served as district manager, sales manager, machine tool division manager and, since 1956, as executive vice president, was elected president of the firm.

# SHEFFIELD PURCHASES COGSDILL DRILL

Acquisition of the drill making facilities of Cogsdill Twist Drill Co., Inc., and transfer of sales and manufacturing to Greenfield, Mass., was jointly announced by officials of Cogsdill and The Sheffield Corp., Dayton, Ohio.

Marketing policies of the firm will follow past practices with distribution

of its products continued through established Cogsdill dealers.

Stewart Cogsdill will act as consultant to the Cogsdill Twist Drill Company of Greenfield and Roy Heldenbrand will operate the plant as general manager.

\* mms

#### ALLEN MOVES TO NEW PLANT

After nearly fifty years of manufacturing hex socket screws and related products in downtown Hartford, Connecticut, The Allen Manufacturing Company has formally opened its new main office and manufacturing plant, which is located on a 32 acre site situated in Bloomfield. about seven miles from Hartford. Manufacturing operations began in the new plant early in September of last year, after a move that involved the transfer of hundreds of various types of machines from the old location in Hartford.

Major installations of new equipment, designed especially for production, engineering and testing operations, have been made in the new Allen office and manufacturing plant located in Bloomfield.



news of the industry . . .

#### U. S. DRILL HEAD COMPLETES SECOND PHASE OF BUILDING PROGRAM

Completion of the second phase of its three-quarter million dollar building program has been announced by the United States Drill Head Co., Cincinnati, Ohio, with the opening of the 11,000 square foot structure which will accommodate the Standard Pattern Division of the company at 5298 River Road.

The first in the group of three buildings to be erected on a thirteen acre site was the 7,000 square foot plant, completed a year ago, which houses the company's aluminum, brass and bronze foundry.

Some time in the near future, ground will be broken for the third

unit, a building of approximately 45,000 square feet, which will house United States Drill Head Company's Machine Tool Division, now located at 616 Burns Street and at 1950 River Road.

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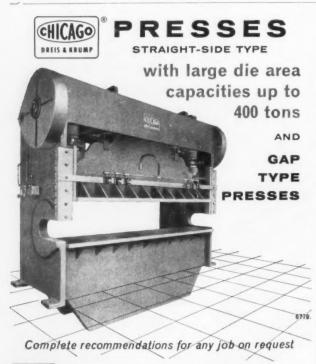
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Since 1915, the company has manufactured various types of fixed center and adjustable multiple spindle drilling and tapping heads.

\* mms

#### DEXCO OFFERS NEW SERVICE

Dexco Corp., Raymac Division, Detroit, Mich., has announced its greatly enlarged services for custom reconditioning solid carbide tools. This program has been speeded up in answer to customer problems of maintaining an





162

Press Brakes - Straight-Side-Type Presses - Press Brake Dies
Hand and Power Bending Brakes - Special Metal-Forming Machines

# **DREIS & KRUMP**

MANUFACTURING CO.
7418 South Loomis Boulevard, Chicago 36, Illinois
For more data circle 425 on Postpaid Card

#### news of the industry . . .

evenly balanced toolroom stock. The advantages of this service are the speed and efficiency with which orders are expedited. As tools are received, the specifications are recorded and immediately they go into the grinding department. Ordinarily the tools are processed and shipped within seven to ten days after receipt at the plant. In order to assist customers

in extreme cases of emergency, Dexco stated that it will make delivery the same day that the tools are received.

In addition to reconditioning tools of its own make, Raymac is also equipped to regrind other tools to customer prints.

In addition, the company has a planned program designed for reconditioning tools on a contract scheduled basis, which is advantageous in reducing toolroom inventories.



You will produce stampings at less cost if you select a Kenco Press exactly suited to the requirements of your job. With the greatest selection available from the Kenco Catalog, there is no need to compromise on shutheight, strokes per minute, throat depth or any other specification. Kenco will most nearly meet your specific needs.



Kenco features include up to 100% stronger frame; solid steel, heat treated crankshaft free from weakening slots, Cyclo-Safe Roller Clutch, extra long "V" type Ram Guides and many other cost saving features.

Write for our new Bulletins that give complete information and specifications on Kenco Presses. There is no obligation

The Most Complete Line of



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January, 1959

modern machine shop

Small Punch Presses in the World

163

# Descriptions of new machines, tools and materials for metalworking.

#### TAPPING MACHINE

Kaufman Manufacturing Co., 551 South 29th St., Manitowoc, Wis., has introduced its Model 10E-1125 Tapping Machine for drilling, countersinking and tapping a wide variety of flanged valve bodies. It is a three head machine provided with 7½ h.p. standard head units, four spindle adjustable heads and five division index. Head units are provided with six speed transmission, hydraulically operated adjustable feed, rapid ad-

Kaufman Model 10E-1125 Tapping Machine

vance and adjustable time delay at the bottom of the stroke.

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The Model 10E-1125 handles a large range of flanged bodies with different diameter of drills, countersinks and taps on a variety of bolt circles. For example, four holes are completed in a part at one time.

For more data circle 58 on Postpaid Card

\* modern machine shop \*

# MACHINES OFFER INTERCHANGEABLE HEADS

A series of interchangeable machine tools, the Deckel LK Series, has been introduced by Cosa Corp., 405 Lexington Ave., New York 17, N. Y. This series provides simple, interchangeability of jig boring, jig grinding and optical projection measuring heads on one base; direct numerical readings of settings; and built in compensation for thermal expansion.

Change from jig boring to jig grinding or optical projection measuring machine takes only minutes. Individual heads are mounted on an extremely rigid bracket, supported on a rugged, heavy base. Any of the three types can be used as a single purpose machine, or all three as a universal machine with but one base.

Table measurements can be read directly in numbers to 0.0001 inch.

# and shop materials

Edited by L. L. BALDHOFF

new shop materials

This is accomplished by the projection of precision glass scale graduations through a system of lenses and mirrors. There are no conversions or interpolations and reading errors become virtually impossible.

To further protect the inherent accuracy of these machines, the supporting bracket contains built in compensation for thermal expansion. Additional thermal stability is provided by a special air duct that dissipates heat generated from the drive motor and by an extra large amount of oil

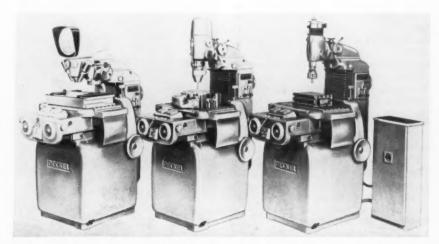
to maintain practically constant gearbox temperature.

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\* modern machine shop \*

#### PRESS BRAKE WITH TWO SPEED OPERATING CYCLE AND ADJUSTABLE STROKE

A 25 ton, six foot bed, hydraulically operated press brake with an adjustable stroke and a dual speed operating cycle with power work stroke, has



Deckel LK Series Machines offer interchangeable heads and direct numerical readings

#### new shop equipment . . .



Di-Acro Hydra-Power Model 16-72 Press Brake

been introduced by O'Neil-Irwin Manufacturing Co., 576 Eighth Ave., Lake City, Minn. Called the Di-Acro Hydra-Power Press Brake Model 16-72, the stroke adjustment feature of this machine enables the operator to preset the stroke of the ram—in less than 15 seconds—to the narrowest possible opening for each job. As a result, an efficient production rate can be maintained on any job because the rate of strokes per minute is increased as the stroke or opening is decreased.

The dual speed operating cycle, with the power work stroke feature, automatically provides two speeds to the ram during each operating cycle. The ram travels at fast speed to a preset point just above the work, goes through the work part of the stroke in slow speed and then resumes fast speed on the return portion of the stroke.

A combination hydraulic and mechanical system is used to power the press brake. Basic source of power is through a hydraulic system which has two oscillating rotary type cylinders of different sizes mounted on the same shaft at the top of the machine. The shaft is mechanically linked to the ram through eccentrics on each end of the shaft. When force is applied to the cylinders, the resulting pressure transmitted to the work by the ram is said to always be equal.

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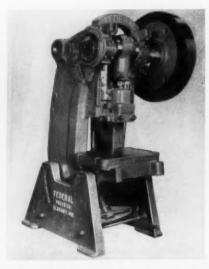
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modern machine shop

# NEWLY DESIGNED LINE OF O.B.I. PRESSES

The Federal Press Co., 804 Division St., Elkhart, Ind., has introduced a newly designed line of open back inclinable presses. This line of o.b.i. presses features new and heavier, one piece cast iron frames of high tensile strength. The Machine Tool Grade cast iron used in the frames has high compressive strength, mass that in-



Federal Model No. 5 Press has 56 ton capacity

sures rigidity, high vibration dampening qualities and the ability to withstand deflecton without permanent deformation.

Other features include: Timken bearings; oversize crankshafts; solid, web type flywheels; long vee type ways and gibs; a non-repeat safety clutch and, also, a front operated recline mechanism.

The presses are available in either flywheel or back geared models. Sizes range from 7 to 100 ton capacities.

For more data circle 61 on Postpaid Card

\* modern machine shop

#### AUTOMATIC MACHINE FOR RIVET DRILLING AND TAPPING

An automatic machine for rivet drilling and tapping has been announced by Snow Manufacturing Co., 435 Eastern Ave., Bellwood, Ill. This horizontal machine may be used with a hand feed magazine for short runs or with hopper feed for long runs. An automatic air operated cylinder

clamps the part securely for drilling or tapping. Production of 500 to 3,200 per hour is said to be obtained, depending upon the hole size and material. Capacity varies from No. 72 drill (0.022 inch) to  $\frac{3}{8}$  inch with spindle speeds from 500 to 10,500 r.p.m. Tolerance on depth is within 0.002 inch.

The main feature of this machine is that it permits minimum tooling costs for each job. For example, in the accompanying illustration, 0.081 inch holes (No. 46 drill) are being drilled ½ inch through at the rate of 3,000 per hour. The only tooling needed was the magazine and the insert jaws. Changeover time required was less than ten minutes.

For more data circle 62 on Postpaid Card

\* modern machine shop

#### PRECISION DRILLING MACHINE

A versatile precision drilling machine, expressly designed for the needs



Snow Rivet Drilling and Tapping Machine



Leland-Gifford Precision Drilling Machine

#### new shop equipment . . .

of the modern pattern or model shop, has been developed by Leland-Gifford Co., Worcester 1, Mass. It features an extra large, plain surfaced tilt top table; deep spindle nose to table capacity; heavy duty spindle and quill; and wide speed range.

The table measures 40 inches wide by 23 inches deep, tilts to 45 degrees either side and has a smooth top to facilitate work handling during planing or milling operations. It is raised or lowered by a convenient hand crank with 29 inch maximum spindle nose to table distance. Space between spindle and column is 13 inches, which permits working to the center of pieces up to 26 inches wide.

Speeds of 150 to 3,600 r.p.m. are available through a four speed motor and back gears. A conveniently located handwheel changes speeds and shifts gears without stopping the machine. Speed settings are indicated on an illuminated chart.

For more data circle 63 on Postpaid Card



#### HIGH TEMPERATURE FURNACE

Lucifer Furnaces, Inc., Neshaminy 6, Pa., has announced the addition of a new series of electric heat treating furnaces. The Series 6055 is made in six standard models with heat ranges to 3,000 degrees F. The Kanthal Super Element is used in all 6055 models. Resistance of the Kanthal element does not change with use, making possible the connection of new and used elements in a parallel or series without detrimental effect.

All standard models include an automatic controller (indicating and controlling), platinum-rhodium thermocouple, magnetic contactor, Kan-



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Lucifer Series 6055 Heat Treating Furnace

thal Super Elements, terminals, aluminum strips for terminal connections and an element transformer.

This series is available in box or tube type construction.

For more data circle 64 on Postpaid Card

\* modern machine shop

# COMBINATION MAGNETIC AND FABRIC COOLANT FILTER

Barnes Drill Co., Department 860, Rockford, Ill., has announced its line of Kleenall Combination Magnetic and Fabric Coolant Filters, incorporating several significant design changes



BarnesdriL Model MP-20 Separator with trough type distributor tank and pump

which improve the operation and life of the filter and make possible reduced maintenance. Emphasis has been placed upon anti-wear features and ease of access and installation. The Kleenall Filters are available in standard sizes and capacities as formerly offered and can also be adapted to central system installations.

Of primary importance is the increased clearance between the filter fabric and distributor. This provides increased capacity for handling heavy swarf loads, reducing maintenance and extending the life of the drive

mechanism.

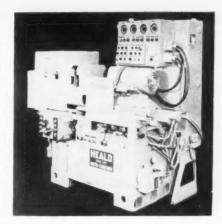
On the drum drive shaft, a separate sun gear is provided for ease of adjustment or replacement without removing the drive shaft. Two planetary gears are also provided in the gear train, improving drive operation by distributing the load and minimizing wear. For more data circle 65 on Postpaid Card

modern machine shop

#### INTERNAL GRINDERS

Two internal grinders have been introduced by The Heald Machine Co., Worcester 6, Mass. They feature Rite Angle design, in which the table is inclined at an angle of 30 degrees to the work. The inclined table prevents any tendency to lift when the work is fed into the wheel, achieving solid wheel backing to take heavy pressure, true table tracking, excellent swarf and coolant drainage and an excellent base for mounting wheel heads.

The Model 180A is a roll type centerless machine, designed for small to medium size work that can be rotated on its own o.d. Work with 3/4 to 41/2 inch o.d. can be handled and holes up to 3 inches long can be ground. Maximum included angle of taper on Size-Matic type is 60 degrees. Base on floor is 50 inches long and 30 inches



Heald 170A Chuck Type Internal Grinder

wide and the unit requires only 80 by 80 inches of floor space.

The Model 170A is a chuck type internal, versatile, high production machine for automatic chucking of small to medium size work that cannot be rotated on its own o.d. The machine handles work up to 41/2 inches o.d. with maximum hole length of 2 inches and maximum hole diameter of 2 inches. It has a 10 inch swing inside hole and 71/2 inch table travel. Measuring 50 by 30 inches, it can be located with coolant tank on floor space of 86 by 80 inches. For more data circle 66 on Postpaid Card

modern machine shop

#### MILLER HAS THREE DIMENSIONAL HAND HYDRAULIC TRACING CONTROL

A new Contourmaster Milling Machine, equipped for three dimensional hand guided hydraulic tracer controlled milling, was recently announced by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. This machine, designated as the 1C, retains the basic advantages and design char-



FOSTER SUPPLIES CO.

6122 Milwaukee Ave., Dept. MMS, Chicago 46, III. For more data circle 427 on Postpaid Card



For more data circle 428 on Postpaid Card

new shop equipment . . .

acteristics of the 1A and 1B styles. The principal difference is in the type of tracing equipment: vertical automatic depth control to the spindle for the 1A and 1B styles and three dimensional hand guided hydraulic tracing for the 1C style.

Four distinct combinations of feed movements are available on the 1C Contourmaster: (1) all three movements are active for complete three dimensional control; (2) vertical movements blocked out for 360 degree profile milling in a horizontal plane; (3) cross feed blocked out for depth control milling, using vertical feed and table feed; and (4) table feed blocked out for depth control milling, using the vertical feed and cross feed.



Cincinnati No. 1C Contourmaster Miller

# Both NEW and DIFFERENT SHELDON 15" PRECISION LATHES



New. Revolutionary double-box Headstock (Pat. Pend.)

New, "WORK-HOLDING ONLY" Spindle.

New. Single-Shift Back Gear Lever on Headstock.

New. Headstock and Apron running in oil.

New. 11/2" Hole through Spindle. New. 60-pitch Gear Box with built-in Lead Screw Reverse. New. Amazing LOW PRICE.

#### DIFFERENT

Different. Spindle rigidly held in two large "Zero Precision tapered roller bearings arranged in box-type

Different. Electrical switches and push-button stations fully enclosed in built-in well in head-

Different. Two independent clutches in apron for selecting power feeds.

Different. Cam-action tailstock clamp for rapid release and instant locking of tailstock.

Different. Triple, cogged, V-belt outboard drive-eliminates intermediate shafts-delivers more

This is an all new lathe that bridges the gap between conventional belt driven and geared head lathes. It combines the capacity and power of a geared head with the economy and flexibility of a belt driven lathe. Available with 5', 6' and 8' bed lengths providing 31", 42" and 66" center distances.

SHELDON MACHINE CO.	, INC. 4250	No. Knox	Ave.,	Chicago	41,	U.S.A.
Gentlemen: Please send me infor	mation on items	checked.				
☐ The NEW and DIFFERENT SHELDON 1	15" Lathes					
☐ Sheldon ☐ 10" ☐ 11" ☐	13" Lathes					
☐ 11" and 13" Variable Speed Lathes						
☐ High Speed Turret Lathes	Name			Title_		
☐ Sebastian 13" and 15" Geared Head	Company Name					
Lathes	Street Address				[]	Company
Horizontal Milling Machine					П	Home
Sheldon 12" Shaper	City					
☐ Name of Local Dealer	City		47.5	//		
☐ Have Representative Call	State					

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Send in Coupon

for full information \

#### new shop equipment . . .

In one setting, the full 22 inch table travel and 10 inch cross travel can be used for 360 degree hand guided profile milling cuts. Ram mounting of the spindle carrier permits the milling of work wider than 10 inches in two settings. Vertical range of the spindle quill is  $3\frac{1}{2}$  inches. A one h.p. motor

drives the spindle. There are eight speeds, 215 to 5,650 revolutions per minute.

For more data circle 67 on Postpaid Card

\* modern machine shop \*

#### HYDRAULIC MARKING UNIT

Cadillac Stamp Co., 17323 Ryan Rd., Detroit 12, Mich., is now produc-

ing a standard packaged unit for hydraulic roll marking. It is available as the No. 58U, with or without the hydraulic power unit and, also, as the No. 58 Hydraulic Marking Machine, which incorporates the No. 58U mounted on a standard base. This unit can be mounted right side up.





The Cadillac No. 58 Marking Machine

#### CUTTERS SHARPENED REAMERS

Hand Reamers—Machine Reamers Stub Screw Machine Reamers Rose Machine Reamers—Step Reamers

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End Mills-Milling Cutters-Saws

Industrial Cutter Grinding & Supply Co.
102-20 Corona Ave. • Corona 68, New York

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No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to 1/4" steel plate.

BREMIL MFG. CO.
1020 Holland St., Erie, Pa.

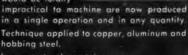
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# COLD EXTRUSION

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Intricate Shaped Cavities are Produced by Cold Extrusion to Precision Accuracy...

Cavities that would be totally



Lower cost—closer tolerances.

Send drawings of your designs for quotation to:

#### **ANTON MACHINE WORKS**

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# Good Work Requires A Good Bench.



Write Today for Our Catalog and the Name of Your Local BAY Distributor

BAY PRODUCTS INC.

1825 CAMBRIA ST., PHILA. 32, PA.

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#### new shop equipment . . .

upside down, sideways or at any angle or location. It is very compact—only 1 foot square. The No. 58U is a completely hydraulic marking unit, employing the roll marking principle, and permits the marking of parts while in a fixtured position on rotary feed tables, in-line transfer units and other automated setups.

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IDEAL

LIVE CENTERS

#### COILER FOR TUBING, BAR AND STRIP

BAND

Curvit Corp., North Attleboro, Mass., has announced an addition to its line of coilers for tubing, bar and strip. The new Model C-1 has been designed for making coils of various diameters and pitch. In the illustration a coil in 5/16 stainless tubing is being made, while beside it are smaller diameter coils made on the same machine with the same setup. The important advantage of this model

> is its versatility. The radius of the coil or circle can be varied by turning the crank at the left of the machine. The pushbutton station on the front of the machine permits running a straight length followed by a radius, as is used in a U bend, while the reversing switch below it permits forming either right or left hand coils. For more data circle 69 on Postpaid Card



99 times out of 100. Ideal's GOLD BAND Live Centers offer savings, simplified operations and higher lathe output both in quantity and quality. Contact your distributor today!

In the GOLD BAND

line Ideal has combined

the latest production

methods with their tradi-

tionally fine craftsmanship

to bring you an unequalled standard of excellence in live centers. Accurate, (to ± .0001") GOLD BAND Live Centers offer "custom" quality at production prices. Specify GOLD BAND Live Centers and your

every need can be accom-

modated from stock . . .



Write for Complete catalog data and specifications.

IDEAL INDUSTRIES, Inc. 1031-A Park Ave.

Sycamore, Illinois For more data circle 435 on Postpaid Card



Curvit C-1 Coiler

- PIERCING PUNCHES
- **BUTTON DIES**

CINCINNATI 9

STANDARDS · SPECIALS

Also send Blue Prints for Estimates on screw machine products and centerless grinding.

PEMCO PERFORATORS CO. DIVISION PORTER MACHINE CO.

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READING BENCH KEYSEATER

Portable - move directly to job; a time saver for both small and large shops.

33/4" stroke; adaptable for other work. Low first cost prompt delivery.

Good dealers wanted. READING MACHINE CO.

CINCINNATI 37, OHIO

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#### When it comes to CAMS...come to ROWBOTTOM

OHIO

Take advantage of Rowbottom "know-how" and exclusive specialized service in CAM production. Any quantity . . . any type . . . promptly . . . economically. Rowbottom will contract to make your cams, handle your rotary profiling or furnish the machines. New literature available immediately.

The ROWBOTTOM MACHINE CO., P.O. Box 4097, Waterbury, Conn.

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#### The best

#### sheet metal ROLLER LEVELER ever built!



Send for FREE BOOKLET. Our brochure gives complete specifications and data. Write for your copy TODAY.

#### WOEHR ROLLER LEVELERS

(in several standard models) flatten steel, aluminum, brass and copper in widths up to 60" . . . in gauges .010 to .125! Your fabricating capacity and efficiency are increased immediately! Safe, one-man operation is simple and accurate.

machine co.

13 FAVOR STREET - ROCHESTER, NEW YORK

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#### SURFACE GRINDER

Brown and Sharpe Manufacturing Co., Providence 1, R. I., recently introduced its 618 Micromaster, which has been designed for rapid production of highly accurate surface grinding of small and medium sized work with unusual surface finish.

The Brown and Sharpe Micrometer is available in three basic models: (1) with hydraulic and hand longitudinal, and hydraulic and hand cross feeds; (2) with hydraulic and hand longitudinal, and hand cross feeds; and (3) with hand longitudinal and hand cross feeds.

Unit construction permits all machines to be assembled to customer requirements—over 100 combinations of spindles, spindle drives, locations of handwheels and so on are possible.



Brown and Sharpe 618 Micromaster Grinder

As the number implies, the 618 grinds work to 6 inches wide and 18

#### DRILL HARDENED STEELS WITHOUT ANNEALING -



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon - high chrome steels of any degree of hardness. "HARDSTEEL" Drills fit standard drill presses. They save time and reduce

rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly. Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" Drills are cutting costs in thousands of plants.

BLACK DRILL COMPANY, INC.

1372 East 222nd Street \* Cleveland 17. Ohio

YOU HARDEN IT - "HARDSTED

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#### SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists and tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes ½2" to ½", by ½4"—plus handy ½" size. Length 4½". ONLY \$17.90.
Single sizes available

R. L. SPELLMAN CO. • URBANA, OHIO

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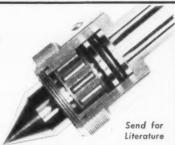


Live Centers

Rotating FAVOR lathe centers are mounted inside the whole length of the toper shank permitting .0001 indicated runout, Axial pressure is absorbed by a large longitudinal bearing. Roller bearings are adjustable. Available in 26 types.

TECHNI-TOOL PRODUCTS, Inc.

3860 W. Slauson Ave. . Los Angeles 43, Calif.



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# NOW! MARK NAME PLATES

5 TIMES FASTER

... and SAVE ... SAVE ... SAVE!



# Automark ELECTRIC TAG MARKING TYPEWRITER

Just a touch of the finger delivers up to 2 TONS pressure for deep, legible impressions on metal or plastic tags. Standard electric typewriter keyboard — over 100 characters a minute. A modern marvell

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DEFIANCE MACHINE & TOOL CO.

1920 S. VANDEVENTER • DEPT. MM

ST. LOUIS 10, MO.

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MODEL EMT-2

parts increase these capacities to 18 and 16 inches, respectively.

For more data circle 70 on Postpaid Card

\* modern machine shop

inches long. Using a full size 8 inch wheel with the vertical adjustment handwheel located on the bed, work to 14 inches high can be accommodated; with the handwheel on the upright, the maximum work height is 12 inches. Extra vertical capacity

#### VERSATILE STORAGE RACKS

The P-S 58 Series of low cost storage racks has been introduced by

Palmer-Shile Co., 16022 Fullerton, Detroit 27, Mich. The racks can be used in the warehousing of practically any kind of material.

Palmer-Shile 58 Racks are of extremely simple construction, easy to erect or dismantle by hand. There are no small pieces, only two parts: the vertical panels and the shelves which snap into panel slots to give rigid, no sway support. No bolting or welding is necessary.

The racks are built according to customer specifications of heavy duty channel steel for use with pallets, skids or barrels for storage of either light or heavy materials up to ceiling height. For more data circle 71 on Postpaid Card

# THE MOST USEFUL TOOL IN YOUR SHOP!

#### **ECONOMY ELEVATING TABLE**

- . DIE HANDLER . CONSTANT HEIGHT TABLE
- . LOAD LEVELER . PORTABLE WORK TABLE



Dimensions.....24" x 36" Lift.........24" min. to 42" max.

Capacity .....2000 lbs. Price: F.O.B. Chicago \$245.00

Free 10 day trial in your plant with return privilege

#### **Positive Performance**

Self-locking Acme screws hold load safely, securely, at any height. Roller bearing wheels.

178

#### Compact Design

No projecting parts — all four sides accessible; crank studs at both ends; three table surfaces.

#### CONOMY

4507 W. Lake St.

TOGINEERING Chicago 24, Illinois

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#### FEED RATE INDICATOR

A feed rate indicator, powered by 110 volt a.c., is available from National Automatic Tool Co., Inc., Richmond, Ind. This compact, portable device makes it easy to gage forward and reverse feed rates of machine tool components. It has a range of 0 to 50 i.p.m. over 4 inches of travel.

The indicator consists of a pickup and a control component, both housed for carrying in a single 9½ by 6½ by

4½ inch case. For checking feed rates, the pickup is mounted on a machine way or slide by permanent magnets in its base and the feed rate is read directly from a dial on the control component, which is light enough to be held in the hand.

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mms 

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ADJUSTABLE COUNTERSINK

An easy sharpening countersink. known as the Madison - Marwa. has been announced by the Madison - Relco Co., Providence. R. I. The Madison - Marwa is claimed to give burr free, chatterless performance in a wide range of materials, both metal and plas-Thus, with one tool doing the



Madison-Marwa Adjustable Countersink

work of many, savings can be substantial. Sharpening is simple and is easily done by using a straight cylin-



Drill press vises, angle vises, swivel machine vises, rotary tables, lathe milling attachments, production vises, heavy duty angle vises, and adjustable angle plates are illustrated and fully described in the New Palmgren Catalog. This is the only complete line of work holding devices available anywhere. Designed for production, tooling, and maintenance work, there are 68 different models and types to choose from. Vise jaw sizes are from 1½" to 8". Ask for your copy of this FREE Catalog No. 205 today. The complete line with details and prices are shown.

# PALMGREN PRODUCTS

CHICAGO TOOL AND ENGINEERING CO.
8399 SOUTH CHICAGO AVE. • CHICAGO 17, ILL.

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"TAPCO" checks performance and

"TAPCO" checks performance and in-use costs on dial indicators

Night O





# don't guess ... they know The people at Thompson Products

original cost and a continuing record of all subsequent service costs. Standard Dial Indicators meet the stiff cost and quality requirements at Tapco, and they competitive market. Their TAPCO Group, Cléveland, keeps accurate records of all costs on Dial Indicators. A file card for each Indicator shows date purchased, LHOMPSON PRODUCTS WANT TOP performance as well as lowest over-all cost on their tools so they themselves can give top quality at a price in today's highly can do the same for you.

Ask the Man from Standard or write for full information.



# STANDARD GAGE COMPANY, INC.

POUGHKEEPSIE, N.Y.

A COMPLETE LINE OF GAGES . . . INDICATING, FIXED AND ADJUSTABLE TYPES

For more data circle 446 on Postpaid Card

drical grind, similar to the process involved in grinding a lathe center. There are no relief or clearance angles with which to contend.

Ten sizes are available from stock, ranging from ½ inch in diameter to 2 inches in diameter. Stock angles are 60, 82 and 90 degrees. Special sizes and angles can be supplied on request. For more data circle 73 on Postpaid Card

#### **DIE TRYOUT PRESS**

A 300 ton press has been added to its line of mechanical die tryout presses by Alpha Press and Machine, Inc., 9281 Freeland Ave., Detroit 28, Mich. The unique feature of this design is that the slide rotates up to 270 degrees from its normal position, thereby permitting the diemaker full accessibility to the die with complete safety. Less than a minute is required to return the slide and upper half of

the die to the running position. The die can then be tried and even a production run can be made in this same machine. Since dies can be loaded into the press with an overhead crane and need not be removed until the desired stamping is produced, tryout time is cut to a minimum.

The machine shown in the accompanying illustration is the Alpha S2-300-84-48 Two Point, Four Column, Double Back Geared Die Tryout Underdrive Press. Specifications of this press are as follows: capacity 1/4 inch above bottom of stroke is 300 tons; diameter of the crankshaft at main and connection bearings is 11 by 11 inches:



# when Barry machinery mounts are used in machine installation or moving.

SAVED \$54.00 per machine installation ... American Type Founders

SAVED 90% time and labor in moving machines

SAVED 3 Days production time for entire machine shop

SAVED 20% direct-labor costs . . . Morgan Spring Div. . . . Wickwire Spencer Steel

SAVED \$1500 plus production time and labor cost
... Die Supply Div., E. W. Bliss Co.

The detailed information in these revealing reports furnished by dollar-conscious American manufacturers can save money for you.

WRITE FOR YOUR FREE COPIES.

#### BARRY CONTROLS inc.

783 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS For more data circle 447 on Postpaid Card

#### JIG BORING

to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

#### A. K. TOOL CO., INC.

ROUTE 22, MOUNTAINSIDE, N. J. Telephone: ADams 2-7300

For more data circle 448 on Postpaid Card



#### TAP BUSHINGS

Drives all standard taps from No. 0 to 1 1 1 and pipe taps from 1 and 1

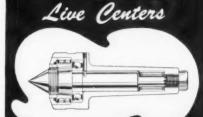
LESS TAP BREAKAGE LESS TAP WEAR Write for Bulletin

#### BYCO INDUSTRIES

2200 SNELLING AVE., MINNEAPOLIS, MINN.

For more data circle 449 on Postpaid Card

# NIELSEN Heavy Duty



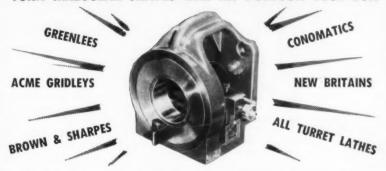
Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

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M on live centers

# NIELSEN, INC. MICHIGAN

For more data circle 450 on Postpaid Card

#### TURN IRREGULAR SHAPES with the POLYGON TOOL BOX



With this Tool Box you can turn hexagonal, octagonal and other irregular contours from round stock, drilled and finished in one operation. Produce mating internal and external shaped parts. 48 Hour Delivery on Cams.

Price and complete details on request.

BRADLEY MACHINERY CO.

4400 CONNER

DETROIT 15, MICH.

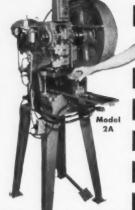
For more data circle 451 on Postpaid Card



#### FAST NAME-PLATE STAMPING

ACROMARKER patented machines are used by the thousands because they're so adaptable to any straight line or true curved line marking job. Several sizes are stocked from 1/16" to 3/8" characters. Styles range from bench and floor stand models to the high production power unit illustrated below that automatically feeds, stamps, serializes, ejects, and collates name plates loaded in a magazine at the front of the press.

Several types of semi- and wholly automatic feeds are available. It's the machine used by the leaders -G.E., Westinghouse, Hoover and many others.



Inventors and Makers of more than 300 kinds of marking machines -largely standardized. Specify ACROMARK to get the right machine for the job."

Write today for Catalog 1-2A. Send your nameplate for sample marking. Indicate production need for engineer's recommendation.

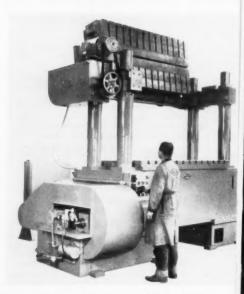
ompany

9 Morell St., Elizabeth 4, N. J.

"THE ORIGINAL MARKING SPECIALISTS"

For more data circle 452 on Postpaid Card modern machine shop

new shop equipment . . .



Alpha 300 Ton Die Tryout Underdrive Press

stroke of slide is 8 inches: shut height. stroke down, adjustment up, bed to slide is 36 inches; adjustment of the slide, motorized, is 12 inches; bolster thickness is 6 inches; bed area right to left, front to back is 84 by 48 inches; strokes per minute with variable speed drive, 10 to 30; 30 h.p. main drive motor. The slide can be rotated 220 degrees from its normal operating position. When the slide is returned to its normal position for running the press, the locking pins must be engaged before the clutch control circuit is operative.

For more data circle 74 on Postpaid Card

modern machine shop

#### 12 INCH VERTICAL SHAPER

Austin Industrial Corp., 76-H Mamaroneck Ave., White Plains, N.

#### "SEALFLEX" TUBING



Leakproof-Stays in place For Coolants, Cutting Oils, Solvents

Made of steel with bross fittings — males, nozzles, stopcocks, etc., made in 1/2", 1/4", prices.

VERMONT FLEXIBLE TUBING CO. Lyndonville, Vermont

For more data circle 453 on Postpaid Card

#### MINIATURE DRILL BUSHINGS

Hole Sizes-No. 80 to 3/32" O.D. 3/32" to 13/64" Lengths 1/4" to 3" .0002 Tolerance on I.D. O.D., and Concentricity Specials to your specifications WRITE FOR CATALOG

#### PREBCO BUSHING CO.

14702 East Arrow Hwy., Baldwin Park, Cal.

For more data circle 454 on Postpaid Card



No oxidation
 No second operations

Totally enclosed head . . . for safety. Direct-over-center positive drive . . . gives more power.

One-piece 360° revolving head . . . . for fewer parts and longer life.

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*W.J.SAVA*GE CO. TENNESSEE KNOXVILLE

For more data circle 455 on Postpaid Card

# HOW SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect

hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:

3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

STURDY BROACHING SERVICE, INC.

23516 TELEGRAPH ROAD

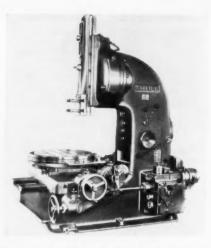
DETROIT 41, MICH.

For more data circle 456 on Postpaid Card

Y., has introduced the Thule Model ST-12 Inch Vertical Shaper, which eliminates complicated tooling and saves production time through its ability to machine, at one setup, parts



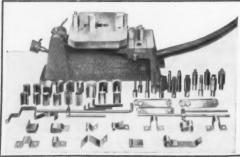
MUSKEGON HEIGHTS MICHIGAN
For more data circle 457 on Postpaid Card



The Thule 12 Inch Vertical Shaper

having regular or irregular, internal or external contours. This sturdy, heavy duty machine uses Meehanite castings throughout. Column and base are cast integral for rigidity and elimination of vibration. Six ram speeds are available from 15 to 75 surface feet per minute.

Some work saving features include: fast ram return at twice cutting speed; ram brake, longitudinal, transverse and rotary movements by hand and power feed; power rapid traverse in three directions; and the ram swivels 12 degrees in the vertical plane.



# Multiform

Users report the Multiform Bender one of the handlest tools in the shop. No special tooling . . Bends, Cuts, Puncher, Flots, Rounds into Any Shape, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

AIR OR HAND MODELS FOR UP TO
1/4" to 4" MATERIAL
Write for brochure which illustrates
and describes the four bender models.

J. A. RICHARDS CO.
Dept. 6-M Kalamazee, Mich.

For more data circle 458 on Postpaid Card

186



THIS HAND IS IN THE CHIPS! Yes, and the chips are not in your eyes or hair or ways of machines. The Heimann Magnetic Chip Remover gets chips out of blind holes rapidly, cleanly, safely. It's a lastingly efficient, permanent magnet in a knurled aluminum holder. Send it in after chips and it comes out covered with them.

YOU CAN'T AFFORD to be without it! A natural for your tool box or crib. Made  $\frac{1}{6}$ " to  $\frac{1}{2}$ " sizes, at a price to attract. Write now for circular.

HEIMANN MFG. CO., URBANA, OHIO

For more data circle 459 on Postpaid Card

# MUMMERT-DIXON FACINGHEADS

Two-way tool feed in 9, 12, 16, 20, 24, 30, 36, 40 and 46 sizes.

One-way tool feed in 6, 9 and 12 sizes. Automatic feed — convenient tool adjustment — quick feed reverse. Save time and costly setups.

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# **MUMMERT-DIXON CO**

120 PHILADELPHIA ST. . HANOVER, PA

For more data circle 460 on Postpaid Card

#### PRECISION BORING BARS

with

#### SOLID CARBIDE HEADS

Cost No More . . .

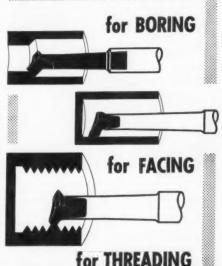
than bars with carbide tipped cutting edges. Solid carbide heads and necks (illustrated in black) are not only much more rigid, but have from 3 to 5 times longer tool life. They're ideal for high-precision lathe and jig-boring work.

Immediate Delivery From Stock

Write for complete catalog on Boring Bars, Toolholders, Livecenters, Driving Centers and others.

R. B. TOOL CO., INC.

17 ROFF AVE. • PALISADES PARK, N. J.



For more data circle 461 on Postpaid Card

Standard equipment includes a 24 inch diameter built in rotary table, arranged for both crank and direct indexing, automatic pressure lubrication and vee belt drive from a 5 h.p. main motor.

For more data circle 75 on Postpaid Card

★ modern machine shop ★

#### SWARFING MILL

Rockford Machine Tool Co., Department 210, 2500 Kishwaukee St., Rockford, Ill., recently developed a machine for swarfing the joining edges of parts or subassemblies having compound surfaces. Swarfing is the oper-

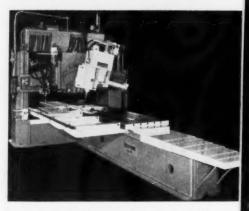


Just slip a tap adaptor into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tail stock center of a lathe. Size 18" x 8" x 14". Included 9 adaptors (8-32 to 34"). Taps not furnished. Write for pamphlet on Tap Guides, Chucks and Autostops.

BRANCH MFG. (O., 15 Olson Drive, North Branch, Minn.

TAR CHINE

For more data circle 462 on Postpaid Card



Rockford Hy-Draulic 3-D Swarfing Mill

ation of "warp" or "twist" milling the edges to facilitate accurately mating surfaces. This machine has been designed especially to meet the rigid requirements of this type of work in the aircraft and guided missile industries. It combines the versatility and efficiency of hydraulic drive with the speed and ease of manual stylus control. Many "fail safe" features protect the operator and eliminate chances for costly scrap.

This machine, known as the Rockford Hy-Draulic 3-D Swarfing Mill, is available in sizes of 30 by 24, 36 by 24 and 42 by 24 inches with rated stroke lengths of 6, 8, 10 or 12 feet. For more data circle 76 on Postpaid Card



For more data circle 463 on Postpaid Card

The Universal Cutting Machine
PARKS M-2 18" Band Saw
Cuts METALS - ALLOYS

PI

PLASTICS - WOOD
... and it costs
less than \$500!

Here is a rugged, precision-built machine that will cut any materials you work ... at the speed best suited for that material—from 50 to 4200 F.P.M. Dual-Range, fully variable gear drive. Priced to fit any shop budget. Write for literature on band saws, wood planers, and radial saws.

#### The PARKS Woodworking Machine Co.

1511 KNOWLTON ST., CINCINNATI 23, OHIO Manufacturers of Quality Machines Since 1887

For more data circle 464 on Postpaid Card



For more data circle 465 on Postpaid Card



#### SIMPLIFIED REPLACEMENT OF CYLINDER SEALS

Flick-Reedy Corp., Miller Fluid Power Division, 2024 North Hawthorne, Melrose Park, Ill., has announced a new method of replacing certain types of power cylinder seals. This method is claimed to save considerable maintenance time and to eliminate the practice of cylinder users having to stock seals for replacement in a variety of sizes to fit different cylinder bores and rod sizes. This method was developed for use on the company's Job Rated Hydraulic Cylinders for 500 to 2,500 p.s.i. service and its Power Packed Hydraulic Cylinders for 3,000 to 5,000 p.s.i. service. The specific seals affected by the new replacement method are; namely, the Miller Piston Rod Bushing Seal and the

> Shef (shearproof. heatproof, extrusionproof and fluidproof) Tubing End Seals.

> This new Miller Method reduces the maximum replacement requirements to only two sizes of seals-one size for its piston rod bushing seals for all rod diameters and one size for its Shef tubing end seal for all bore sizes. This is accomplished through the simple expedient of making both seals available in strip form on spools.

In order to replace either seal. it is only necesary to cut off a section of the seal strip to length and then to insert the cut strip into the proper groove.

For more data circle 77 on Postpaid Card



- New Positive-Acting Feeder
- Automatic Sensing Device
- Easy to Install Simple to Operate

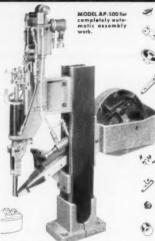
The Dixon Auto-Positioner is a compact, air-operated automatic assembly machine for parts from 1/16" to 2" size at speeds up to 6000 cycles per hour. It is furnished as a fully automatic station for use at a dial or in-line transfer table, or as a self-contained machine with pedestal and fixture table. There are four models, providing a selection of equipment to suit your requirements.

#### Dependable, Accurate, Compact

The new parts feeder is simple, compact (only 6 inches wide), and efficient. It provides positive advancement of the part into the chuck; it has a straight track and a positive-acting escapement; and it requires no separate motor or vibrator. Automatic sensing assures quality control. It interrupts the cycle when a part is missing or improperly assembled.

#### Standard Equipment, Easily Retooled

The chuck, positioning punch, and feeder tooling are easily modified or replaced for other jobs. Compactness permits close nesting at multiple stations, cutting cost of fixtures, dials, or Send for Bulletin AP-B2 or request transfer devices.



The above Auto-Positioner was tooled to feed and place the .455" diameter formed washer into a cup (shown to the right) having .001" clearance.

our machine planning service.



DIXON DIXON AUTOMATIC TOOL, INC. 2314 - 23rd AVENUE ROCKFORD, ILLINOIS

EQUIPMENT FOR AUTOMATIC PARTS HANDLING AND ASSEMBLY

For more dtaa circle 467 on Postpald Card



Preloaded with two Precision Matched
Timken or Bower Taper Roller Bearings
for . . . GRINDING • PRECISION TURNING
HEAVY-DUTY OPERATIONS
Write to:

PACE ENGINEERING COMPANY 1507-B E. Michigan St., Indianapolis, Ind.

For more data circle 468 on Postpaid Card



#### TRUE POINT DRILL SHARPENER

for Drills 41 - 60 and 61 - 80 R.H. & L.H.

A properly sharpened drill cuts faster — more accurately and is less likely to break.

Write for circular and full details.

UP-TO-DATE TOOL CO.
P. O. Box 99, Station A, Worcester 8, Mass.

For more data circle 469 on Postpaid Card



SAVE OVER 50%

Soft-Blank Top Jaws are made to American Standards and may be used on any chuck having master jaws made to these specifications. All are in steck and available for immediate delivery.

WRITE TODAY FOR SPECIFICATIONS AND PRICES

# HURON MACHINE PRODUCTS INC

4250 MONROE BLVD. . DEARBORN, MICHIGAN

For more data circle 470 on Postpaid Card

#### AIRETOOL Pneumatic Tools do more work per dollar

Airetool pneumatic tools operate at the same air pressure as others. Your power costs are the same. Yet Airetool equipment consistently achieves higher production than other tools per man hour. There is a good

reason. Airetool air motors get more work from a pound of air. Your operators get more work from their Airetool pneumatic tools. Why not write today for complete information about these and other Airetool high-production tools? Ask for Catalog #63.



#### MIDGET DIE GRINDERS

Save time on precision, intricate grinding jobs. Use with carbide burrs and abrasive wheels. 38,000 to 60,000 rpm.



#### VERTICAL GRINDERS

Step up production on rough grinding, snagging, depressed center wheel work.



#### HORIZONTAL GRINDERS

Fast for fine finishing, grinding, snagging. 4" to 8" wheels.



PNEUMATIC DRILLS

Handle drilling operations in a hurry. 5/32, 3/16, 1/4, 1/2, 5/8, 3/4" capacities.



CANADIAN PLANT: 37 Spatding Drive, Brantford, Ontario EUROPEAN PLANT: Vloordingen,

The Netherlands Airetool offices and representatives in principal cities of U.S.A., Canada, Mexico, Puerto Rico, South America, Hawaii, England, Holy, Europe, Japan.

For more data circle 471 on Postpaid Card

#### DRILL AND REAMER BLANKS

An expanded line of hardened and ground high speed steel drill and reamer blanks, which features close tolerance limits over the complete range of standard stock sizes from 0.0135 through 1.000 inch in diameter, has been announced by Ace Drill

Corp., Adrian, Mich. These jobber length drill blanks are available in all standard wire sizes from No. 1 through 80, letter sizes from A through Z and fractional sizes from 1/64 through ½ inch diameter in step series of 1/64 inch. They are cut from mill length bars of high speed steel, which are specially heat treated in a continuous furnace, designed and controlled to produce uniform Rockwell hardness. ideal grain structure and extra tough-

> ness. All are then centerless ground to close tolerance limits of plus 0.0000 / minus 0.0002 inch.

Reamer blanks are produced from the same quality material in a corresponding range of sizes to tolerance limits of plus 0.0002 / minus 0.0000 inch. Larger sizes, ranging from 1/2 through 1 inch diameter in step series of 1/64 inch, are cut to standard 6 inch lengths and ground to tolerances of plus 0.0005 / minus 0.0000 inch.

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High Speed Steel Drill and Reamer Blanks

# STRAIGHTEN COIL STOCK from 1/2" to 8" wide...

from .018" to .065" thick ... on a LITTELL "308"\*



Littell "308" Variable Speed Straighteners flatten coil stock...synchronize feeding of stock with speeds of automatic presses . . . simplify hand feeding. The "308" has brought new speed, efficiency and economy into stamping, blanking and shearing operations from coast to coast. Get full details on these portable straighteners.

Write for Catalog Section "C" ROLL FEEDS . COIL CRADLES TRAIGHTENING MACHINES EELS . AIR BLAST VALVES District Offices: Detroit, Cleveland MACHINE Speed with Safety

4163 N. RAVENSWOOD AVE. . CHICAGO 13, ILL. For more data circle 472 on Postpaid Card



#### WHY WASTE TIME?

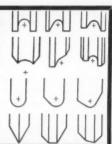
Dress Profiles like these in a few minutes without Templates or Crusher Rolls with the Jeon Automatic Angle Tangent to Radius Dresser. It's fully universal.

Write for Price and Folder.
REPRESENTATIVES WANTED
IN SOME AREAS.

JEDNMANUFACTURING CO.

O. BOX 6750 WASHINGTON 20, D. C.

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#### Fast Machining of Small Parts

DERY Equalizing Gang Vise Jaws give simultaneous 3-point holding for small parts varying in diameter. They allow fast, precision straight or gang machining. Send sample or blueprint for quotation.



A. L. DERY & SONS TOOL & DIE CO.

Pine Meadow, Conn.

For more data circle 474 on Postpaid Card



Send us your old drills—we'll make them new again at a fraction of the cost of a new drill! Exclusive NU-TANG\* process replaces twisted or broken tangs with brand new tangs of correct size — and with GUARANTEED ORIGINAL STRENGTH. No welding—No distortion—No shortening of drills—No sleeves.

Any drill, reamer, or other tool with a Morse taper in sizes 2 to 6 can be repaired perfectly this quick new way. Delivery—One week. Used by many leading industrial plants. Amazingly low cost—satisfaction guaranteed! Send for complete information.

\* Patent No. 2,512,033

NU-TANGS INC. 1335 Bates Street Cincinnati 25, Ohio

For more data circle 475 on Postpaid Card

#### DIE SINKING CUTTERS

Dixie Tool Industries, Inc., 4555 West Franklin Ave., Bridgeport, Mich., has announced that both of its lines of die sinking cutters with straight and right hand spiral flutes may be purchased at the same price. This new pricing system includes the



Dixie Tool Die Sinking Cutter

Dixie "600" Series solid carbide die sinking cutters. These cutters have a standard overall length of 2½ inches, fluting of 12-15 degrees right hand spiral and are right hand cutting. Al-

though these die sinking cutters are normally used with duplicating equipment, they are also quite practical as singular tapered end mills. Dixie Tool Industries will manufacture special carbide cutting tools to any blue print or sketch.

For more data circle 79 on Postpaid Card

\* mms



and

AISI

All seven of our warehouses are staffed and supplied to fill your alloy steel requirements promptly whether you need standard AISI, SAE or our own special HY-TEN steels—"the standard steels of tomorrow".

Write today for Wheelock, Lovejoy Data Sheets containing complete information on grades, applications, physical properties, tests, heat treating, etc.

NEAR YOU... Warehouse Service — Cambridge • Cleveland Chicago • Hillside, N. J. • Detroit • Buffalo • Cincinnati In Canada — Sanderson-Newbould, Ltd., Montreal and Toronto

# WHEELOCK, LOVEJOY & COMPANY, INC.

140 Sidney Street, Cambridge 39, Mass.

For more data circle 476 on Postpaid Card

#### COMPARATOR HEAD

The Model No. AE-22 Comparator Head has been developed by B.C. Ames Co., 29 Ames St., Waltham 54.



Ames Model No. AE-22 Comparator Head

194



#### COLDPOINT DRILL

"The drill that hasn't been stopped yet"

If you have a drilling problem, we think we can solve it. We can sell you the drills or do your drilling on a contract basis.

CINCINNATI 31, OHIO

For more data circle 477 on Postpaid Card



- Tips & Techniques -MACHINE TOOL RECONDITIONING

Send for free folder describing illustrated book featuring hand scraping methods. (3rd printing)

MACHINE TOOL PUBLICATIONS

324 Wabasha, 215 Commerce Bldg. St. Paul 1, Minn.

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WILSON AIR COLLET CLOSER



#### STEP UP PRODUCTION 20% +

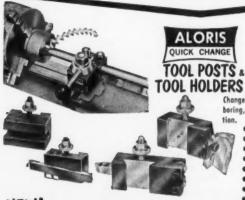
- . . . for most lathes to 1" bar stock capacity
- · Hold delicate parts without damage or adjustment
- Iron grip for heavy work
- No adjusting for stock or part variations Finger-tip or foot control eliminates operator fatigue
- Eliminates jarring of head stock

(Ten day FREE TRIAL to reliable firms)

WILSON AIR COLLET CLOSER, INC. 909 40th Ave. NE, Minneapolis 21, Minn.

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#### FOR MAXIMUM VERSATILITY & RIGIDITY



Change tools instantly - for turning, facing, drilling, boring, threading, knurling, cutting off or any opera-

- Maximum Repetitive Accuracy Assured
- No Shims . . . No Time Wasted
- **Unlimited Versatility**
- Saves 90% Set-up Time, 50% Production Time
- · Greater Rigidity
- · Leading Lathe Mfrs. Recommend It
- · Sizes to Fit Every Lathe
- Unconditionally Guaranteed

The most complete line of tool posts and holders. Write For Catalog & Price List

ALORIS TOOL CO., INC. 419 Getty Avenue

For more data circle 480 on Postpald Card

Aloris Holder for Carbide Triangular Inserts.

For both positive rake and negative rake inserts.

Greater rigidity, versatility, efficiency & economy

Mass., for use with the Porta-Check, which is a portable transistorized comparator. This head has a measuring range of 0.006 inch on the thousandths scale and 0.0006 inch on the tenths scale. Spindle travel to zero position is 0.030 inch and it has a gaging force of 4 ounces. When used with

the Porta-Check, this small but rugged comparator reads to 0.00001 inch. It is fitted with a removable ½ inch long contact point and a 4 foot cable with a connector for plugging into the Porta-Check.

For more data circle 80 on Postpaid Card

\* modern machine shop \*

#### NAIL DRIVING ADAPTER

An adapter, for driving nails and spikes, that fit all electric and pneu-

matic hammers, has been introduced by Modern Manufacturing Co., Inc., 680 Davisville Rd., Willow Grove, Pa. This adapter is used primarily for driving a large quantity of nails and spikes and in places that are hard to reach.

For more data circle 81 on Postpaid Card



# DIXIE ROTARY FILE ASSURES PRECISE CONTOUR CUTS

The tooth across the center on the Dixie rotary file cuts a precise contour without the ragged lines left by other tools. This tooth assures cutting at the center of the tool producing a fine finish in the shortest possible time.

Dixie tools save dollars, save scrap, save time. Also Dixie can regrind your present tools either with or without the Dixie type tooth design.





Nail Driving Adapter



# PILOT BUSHINGS Frictionless —Rotary

For core drilling, T.
C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.

Write for details.

#### GATCO ROTARY BUSHING CO.

42330 Ann Arbor Road, Plymouth, Michigan

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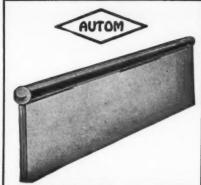
#### DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS Wilmerding, Pa.

For more data circle 483 on Postpaid Card



# **CONTINUOUS HINGES**

Manufactured by

AUTO MOULDING & MFG. CO.

WRITE FOR CATALOG

1114 E. 87TH ST.

CHICAGO 19

For more data circle 484 on Postpaid Card



For more data circle 485 on Postpaid Card

# UNIVERSAL POSITIONING TOOLHOLDER

Maxwell Industries, Inc., 400 East Fifth St., Ashtabula, Ohio, has introduced its universal positioning toolholder, Uni-Max, that holds any 3/16 to ½ inch tool bit or boring bar in any horizontal work position on lathes,

planers, shapers, slotters and so on. The design provides perfect positioning for carbide tip, as well as high speed steel cutters, eliminating the need for special holders for each type of cutter.

Fast, convenient clamping and increased holding power have been engineered into the Uni-Max. The rotating clamping cap has annular serrations that heel perfectly with radial serrations on the shank for a

perfect grip with no laterial movement possible. Straight serrations on the tool bit slot and the rugged half inch cap screw with grip head and hex socket give added holding strength. The manufacturer claims that tools last longer with the Uni-Max, because the tool is held parallel to the shank of the holder and. thus, presents a larger body of metal to absorb the intense heat generated at the cutting edge of





#### REQUEST BULLETIN 50

Here's the required PRECISION for hole tolerances within .0001"

A very modest cost puts it to work . . . no training program, no wire, no air hose or electronics. Unique interchangeable expanding plugs give positive 2-point gaging. Detects tapers, bell mouth, ovality. Shows ACTUAL HOLE SIZE. Fixed — not passing — reading. Special plugs available to gage shoulders, splines, recesses, spherical holes, etc. Ideal for use AT MACHINE, as well as bench.

#### COMTORPLUG USERS INCLUDE

Airesearch Mfg. Co.
Allison Div.
Aprx Electrical Mfg.
Buick Metor Div.
Century Electric Go.
Chicago Pheu. Teol
Continental Metors
Curtiss-Wright
Detroit Transmission
Douglas Aircraft
Fairchild Engine &
Airplanc Co.
Falk Corg.
Ford Motor Co.
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Division

Trical Mig. Harris Seybeld Co.

Prov. Homelite Corp.

Eutric Co. Int. Harvester Co.

Eut. Tool Jacobs Mig. Co.

Lyconing-Spaneer Div.

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Northrop Aircraft

Ingline & Scintilla Magneto

Co. Sele Products Eng.

Studebaker-Packard

Co. Studebaker-Packard

Co. United Airlines

Warner Gear Div.

Marner Gear Div.

Littic Co.

United Airlines

**Hamilton Standard** 

#### COMTORPLUG

For more data circle 486 on Postpaid Card



Uni-Max Toolholder



Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 20

CHICAGO GEAR WORKS

440-50 N. Oakley Blvd., Chicago 12, III.

For more data circle 487 on Postpaid Card



They're a MUST in every shap where many blows have to be struck without marring surfaces. Available with "SHUR-GRIP" drop forged handles.

Write for circular and prices

LAWRENCE H. COOK, INC.

47 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. L.

For more data circle 488 on Postpaid Card



# IMPORTANT ADVANTAGES

LOW COST - costs only a fraction of hand-

made pushers
SIMPLICITY OF INSTALLATION — requires milling of one slot and drilling of one hole COMPACT — engineered and manufactured for minimum space requirements

ANTI-FRICTION — hardened roller on brass shaft requires minimum effort to insert and feed stock

MINIMUM DIE MAINTENANCE - no refitting necessary when die is sharpened . . . in-creases pilot life

Write us for complete information

#### APPLIED MECHANICS CORPORATION 528 Fourth St., N.W., Grand Rapids, Mich. Telephone Glendale 9-8544

Distributor inquiries invited

For more data circle 489 on Postpaid Card

the FASTEST can use



# MATTHEWS No. 201 MARKING MACHINE

If you're making round, conical or tubular parts, you can mark them automatically with the Matthews' "201" Machine! It's the unit you need for fast, fullflow marking in the production line. The "201" gives you sharp, concise marking at 7,000 parts per hour . . . in one operation. Write today for Bulletin 146-C9.

# JAS. H. MATTHEWS & CO.

3944 FORBES AVE. PITTSBURGH 13, PA.

WRITE CALL OR TWX PG 424

For more data circle 490 on Postpaid Card

modern machine shop

199

the tool. This substantial body also supports the cutting tool to operate without chatter.

Three sizes, 5, 6 or 8 inches, will handle all tool bits or boring bars from 3/16 to ½ inch, round or square. For more data circle 82 on Postpaid Card

# DO IT YOURSELF MATERIAL DESIGNED FOR BUILDING STEEL STRUCTURES

Hot dip galvanized Equipto Angle comes in 12 and 14 gauge weights and in 10 or 12 foot lengths.

This new product is available from Aurora Equipment Co., Equipto Division, 606 Prairie Ave., Aurora, Ill. It is punched with scientifically spaced holes and slots so that it may be cut

to any length and bolted together to make such items as storage racks, tables, guards, frames, carts, stands, derricks, ladders and literally hundreds of other items.

This system permits the custom construction of special equipment, yet requires no engineering or mechanical skill to use.

Bolts and nuts are furnished with the Equipto Angle, so that the only steps involved are to cut angles to length (a one stroke cutter is available) and bolt them together.

For more data circle 83 on Postpaid Card



Equipto Angle

January, 1959

Removing chips, shavings, filings, and airborne debris that clog machinery, distort tolerances, mar product finishes.

Controlling mists and fogs in wet machining operations.

Recovering valuable dusts, coolants, heated

Protecting machinery investments with preventive maintenance.

FREE...latest specs and data on TORIT Dust Collectors for handling these and other air pollution problems.

TORIT: the high efficiency line with savings up to 1/2!

Reducing absenteeism with improved health and safety precautions.

WRITE TODAY:

TORIT MANUFACTURING CO.

Walnut & Exchange Sts., St. Paul 2, Minn. Dept. 714

For more data circle 491 on Postpaid Card

Accurate Hole Transfer Made Easy With

#### NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/6" to 3/4 U.S.S. Inexpensive — Last for years.

Write for Circular

NIELSEN TOOL & DIE COMPANY

17360 Lahser Road, room 202 Detroit 19, Michigan

For more data circle 492 on Postpaid Card

#### NEW FLUSH PIN AMPLIFIER



OFFERS 5 to 1 AMPLIFICATION

- No dial indicator needed
   No master required Extremely rugged \* Speeds up inspection \* .001
   to .010 tolerance range. WRITE FOR DETAILS.
- HOLMES GAGE & DEVELOPMENT CORP. Columbus 3, Ohio

For more data circle 493 on Postpaid Card



MARK OF QUALITY

#### NDARD TAPER PINS



 The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide accept-ance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins. Woodruff keys, machine keys and machine racks.

#### STANDARD STEEL SPECIALTY CO.

Plants: Beaver Falls, Pa.; Hammend, Ind.

For more data circle 494 on Postpaid Card

w co priced so SUPERIOR PERFORMANCE low you Gives You More Features, Does More Work Than Any Other can afford Comparable Machine your shop The NEW

CKUS ABRASIVE EEL CUT OFF SAW For Ferrous Metals

HERE'S WHAT THIS SENSATIONAL MACHINE CAN DO IN YOUR SHOP

- Cuts 11/8" bars, 2" tubing, 11/2" pipe, 2" x 2" x 1/4" angles
- · Protects for overload and low voltage
- Has Quick action vise
- PLUS special engineered leverage for maximum sensitive "feel"
- Eliminates costly breakdowns
- Prevents high maintenance

Converts Easily For Cutting of Non-Ferrous Materials Alsol This obrasive saw is already machined to accommodate the Backus Multi-Purpose Saw Unit. With this conversion unit the saw may be used Awnings for cutting both ferrous and non-ferrous metals!

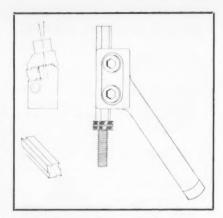
Also Available Backus Non-Ferrous Cut Off Saw For Aluminum and Aluminum Extrusions Plastics, Brass, Slats and Roll-Up

CARLSTADT.NEW JERSEY

For more data circle 495 on Postpaid Card

#### ONE TOOL COMBINES TOOL BIT AND CHIP BREAKER

4 Side Tools, 48 Highgate Rd., Berkeley, Calif., has announced the development of a method of using high speed steel and stellite in toolholders and tool blocks. The tool bit is ground on four edges to use four sides, or the entire bit. The accompanying illustration shows the toolholder and the method of carrying the bit at an angle of 10 degrees to take care of clearance without further grinding. The end of the tool bit is square and, therefore, between sharpenings the tool bit can be revolved to four different positions. An excellent chip breaker is also accomplished so that the chip curls and is free and cool. The result is short, close chips



This newly developed Four Side Tool combines tool bit and chip breaker all in one

which can be disposed of easily. To sharpen the tool, the end is ground square and it is again ready for use. No forming or shaping on the grind-

#### **Combined Center Drills** and Countersinks-60°



SUPER HIGH SPEED STEEL

DRILL CONCENTRICITY better than 0.00012" DRILL GROUND from the SOLID and HARDENED ROD THE TOOL for the HARD-to-DO JOB

#### Price Each Drill Overall Right Hand Left Hand No. Drill Body 1 1/4" \$1.35 00 0.020 16 " 1 1/4" 1.10 0.025" 01 1/8" 1 1/4" .95 1.30 1/32" 0 1/4" 1.00 .80 3/64" 1/16" 1 % 3/32"

#### H. KAPP ENGRS.

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105-25 67th Rd. Forest Hills, L. I., N. Y.

For more data circle 496 on Postpaid Card

#### NEW "IMP" INNER-GROOVE "MIKE"

Measures internal "O" rings and retaining ring groove depths

Now! You can measure those critical grooves quickly and easilyno guesswork-with the all new "IMP" inner-groove "mike". Grooves can be measured in bores as small as 15/32" dia and to a depth of 2" from the face. Price \$38.80.

Send for "IMP" INNER-GROOVE "MIKE" bulletin now

ILLINOIS METAL PRODUCTS

429 W. Superior St.

Chicago 10, Illinois

For more data circle 497 on Postpald Card





#### PANNIER'S INSPECTORS' HAMMERS WEAR LONGER

Many styles and sizes for metal marking. Letters, numbers or symbols on either or both ends; interchangeable type heads available.

Write for data.

#### MONEY-SAVING FEATURES:

- Sturdy, balanced construction
- Long-fasting tool steel head
- A style for every (any) need
- Sharp, clean marking



202 Sandusky Street • Pittsburgh 12, Po.
Offices: Los Angeles • Chicago • Cleveland • Philadelphia • Birminghom
For more data circle 498 on Postpaid Card

# HYBCO TAP GRINDER

Sharpens Chamfers, Flutes and Spiral Points



**MODEL 1100** 

 $^{\circ}$  Capacities No. 0 Machine Screw to  $1\frac{1}{2}^{\prime\prime}$  Hand Taps.

HENRY P. BOGGIS & CO. 708 E. 163rd St., Cleveland 10, Ohio

For more data circle 499 on Postpaid Card January, 1959



For more data circle 500 on Postpaid Card modern machine shop 203

ing wheel is necessary, as this has been taken care of in the angle of the toolholder. In the drawing a stop is shown which can be applied to the back of the toolholder, if desired, for positively positioning the bit so that the cross slide setting and adjustment need not be disturbed. The same arrangement can be used if three,

four or more tools are required preground to length to adapt the toolholder as a turret block.

For more data circle 84 on Postpaid Card

\* modern machine shop

#### HEAT TREATED REVOLVING STYLE DIE HEAD

Landis Machine Co., Waynesboro, Pa., recently introduced the yoke operated JN Landex Heat Treated

Revolving Die Head, which has been designed for application to automatic screw machines and other machines that employ a live spindle. Its free float feature allows for a centering action between the die head and the workpiece in the event of any misalignment.

Recommended for commercial threading, the JN Landex Head is available in four sizes: ½, 13/16, 1½, and 2 inches, having standard ranges of No. 4 to ½ inch, No. 4 to 13/16 inch, ½ to 1¼ inches and 3% inch to 2 inches, respectively.

For more data circle 85 on Postpaid Card



Here's the all new Wells Model 58-B... a metal saw designed and built for double duty—double value. It's a compact, rugged, well guarded, extremely versatile unit... economically priced. As a horizontal cut-off saw, Model 58-B features quick-action vise (swivels to 45°); automatic shut-off; adjustable guides. Capacity: 6" x 10" rectangular shapes; 6" dia. rounds. For vertical use, swing head to upright position and install work table. Optional wheel-handle unit provides complete mobility. Write for complete information.



The Pioneers of Horizontal

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
808 Tyler Street Three Rivers, Mich.

For more data circle 501 on Postpaid Card



JN Landex Die Head

# SAVE MAINTENANCE



with Air-O-Check, the Leak - Proof Air Gun. Hundreds of thousands in use in factories, machine shops and foundries . . . wherever air is blown.

Expert design of internal fulcrumed lever insures leakproof, dependable, care-free service.



Model A

Write today for literature and prices.

Model FA

AIR-WAY PUMP & EQUIPMENT CO.

For more data circle 502 on Postpaid Card



Model
No. 4

The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this



NAMEPLATE DETAIL PRESS.

• Simple Operation

Perfect Alignment
Uniform Depth

GEO. T. SCHMIDT, INC.

1806 W. BELLE PLAINE AVE.

CHICAGO • 13 • ILLINOIS

For more data circle 503 onPostpaid Card

January, 1959



Get This Production Boosting
'TRICO-MIST''
COOLANT SYSTEM

With Flexible Armored Coolant Lines And Kwik-Change Nozzle With Guard



For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers—single or multiple outlets—single or dual valve control.

SEND FOR BULLETIN 37

TRICO FUSE MFG. CO.

For more data circle 504 on Postpaid Card

modern machine shop

205

# HEAVY DUTY PORTABLE HYDRAULIC LIFT TABLES

Lexco Engineering and Manufacturing Corp., 20 West Chestnut St., Souderton, Pa., has announced hydraulic lift tables in capacities up to

# A COMPLETE SHEET METAL SHOP IN ONE MACHINE

#### PULLMAX

DOES ALL OF THESE OPERATIONS



#### \* CUTS MILD STEEL UP TO 11/32"

The one machine that's sure to save time, labor and material when you work sheet or plate. Eliminates expensive die costs—easy to operate. 7 sizes to choose from.

Write for free catalog on Metalworking

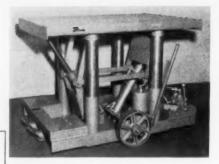
... 16 m.m. sound film
... or a demonstration right in your plant.



#### AMERICAN PULLMAX CO., INC.

2465 N. Sheffield Ave., Chicago 14, III.
See us in Booth 535, Western Metal Show, Los Angeles,
Calif., Mar. 16-20.

For more data circle 505 on Postpaid Card



Lexco Portable Hydraulic Lift Table

5,000 pounds. They have been designed and developed to meet the need of shops and factories handling heavier dies and equipment in and out of presses and machines.

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These units feature rugged, all steel welded construction of high quality materials and workmanship with 2 inch thick rail type top, 44 inch length, 30 inch width, 18 inch low, 32 inch high, with double acting hydraulic cylinders, large capacity pump, four way valve and built in stabilizers. Rolling equipment is as follows: 10 inch wheels at center and 5 inch casters at each end.

For more data circle 86 on Postpaid Card

modern machine

#### GAGE SIMPLIFIES INSPECTION AND SETUP PROCEDURES

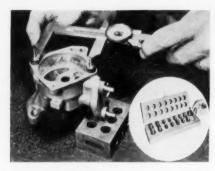
Spence Industries, 6910 Chase Rd., Dearborn, Mich., recently introduced its line of Jo-Plugs. These gages simplify inspection and setup procedures for checking the dimensional accuracy of threaded hole centers. The gage consists of a threaded plug base and an upper spindle, called a Jo-Spindle. Jo-Spindles act as a constant throughout the entire range of plug sizes and are a uniform 0.200 in diameter.

To check center distances, proper size Jo-Plugs are screwed into the

January, 1959

206

modern machine shop



Practical application using Jo-Plugs

holes, allowing the Jo-Spindle to act as reference measuring points. The checker then has only to measure the distance between Jo-Spindles and add the constant (0.200) to obtain the distance between centers within a tolerance of plus or minus 0.00015.

Jo-Plugs are made of hardened

Graphmo tool steel and are precision ground to assure a square, flat seat. They are available in boxed sets in thread sizes ranging from No. 4 to 1 inch, National fine or coarse thread or special thread forms.

For more data circle 87 on Postpaid Card

To more usia entito or on resipula our

\* modern machine shop \*

#### **AUTOMATIC SURFACE GRINDER**

The Blanchard Machine Co., 64 State St., Cambridge 30, Mass., recently introduced its Center Column Automatic Surface Grinder with 80 inch o.d. work table and three grinding wheel spindles. This grinder, designated as the Blanchard 80-A3, has been based upon the same grinding principle as other Blanchard Automatic Surface Grinders. Each wheel is maintained at the correct height by a finger type feed control caliper. Since the work table is non-



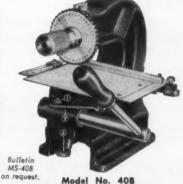
# Numbering and Lettering Press Mono Wheel Automatic Spacer

Designed for the purpose of impressing Letters and Numbers in all kinds of Name Plates and Flat Metal Parts. The Dials 3¾" Diameter are made of Special High Grade Tool Steel, scientifically hardened and tempered. The Characters are carefully engraved and make clear cut impressions of uniform depth. Stan-

dard Dials are engraved with 40 characters. Character Heights as follows: 1/16, 3/32, 1/8, 5/32, 3/16". Different size Dials are interchangeable. Carriage Table advances one space with each impression of the Dial, like a typewriter, doing rapid work, even spacing and perfect alignment.

Plates up to 5" wide and 6" long can be stamped, but can furnish a longer Table and Rack if required. Depth of impressions is adjustable by a screw on bottom of machine. A direct sight gauge is provided, to facilitate stamping in the proper place. We can also make steel type with round face characters.

NUMBERALL STAMP & TOOL CO. HUGUENOT PARK STATEN ISLAND 12, N. Y.



For more data circle 506 on Postpaid Card

magnetic, all parts are held in fixtures during the grinding cycle.

Specifications of the Blanchard 80-A3 include: range-work must lie between two concentric circles 48 by 80 inches in diameter; table-plain 48 inch i.d. by 80 inch o.d.; wheels-18 inch cylinder or 22 inch segment; feed -manual or power (rapid raising or



# SLEEVES SOCKETS NOW! HEAT TREATED ...

So popular with users.

**COLLIS Heat Treated Sleeves and Sockets are** manufactured by skilled workmen to give long durable service and extra long life. This type of sleeve has less chance of nicks and assures same accuracy with longer runs.

Call at once for our representative to explain about the Complete Collis Line of Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as Sieeves and Sockets and Collets.

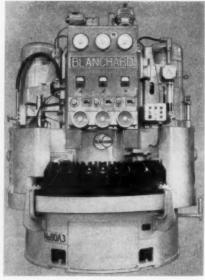
"Call Collis for Service"

#### THE COLLIS

DEPT. A, CLINTON, IOWA

modern machine shop

For more data circle 507 on Postpaid Card



Blanchard Center Column Surface Grinder is used to rough grind both sides of both ends of automotive connecting rods

lowering of wheel heads by power); motors-25, 30 or 40 h.p. each spindle, 3 h.p. table; floor space — 7 feet 8 inches by 8 feet 2 inches; weight, net -40,000 pounds.

For more data circle 88 on Postpaid Card

modern machine shop

#### TOOL BOX PERMITS TURNING IRREGULAR SHAPES

An improved model of the Chatwin Polygon Tool Box, which reduces machining and handling costs, is now available from Bradley Machinery Sales Co., Inc., 4400 Conner, Detroit 15, Michigan.

The Chatwin Polygon Tool Box permits the turning of any irregular shape on any turret or automatic lathe, eliminating the necessity of transferring many types of work to

#### REICH - THE ONLY 3-WAY PRECISION TEST INDICATOR

Accurate and repeated reading in either direction. No mirror needed to read both sides or top. Non rust, non magnetic movement. .014" reading.



J. R. REICH MANUFACTURING

201 E. Stroop Road Dayton 29, Ohio For more data circle 508 on Postpaid Card

#### BORING

and

**Large Precision Machining** Done to your specifications

We have 22 Jig Borers

KIDDE PRECISION TOOL CORP. 15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 509 on Postpaid Card

#### BETTER WAY TO CLEAN

DIES and individual metal PARTS

- For
- PRODUCTION
- MAINTENANCE MODEL

500 \$32900



**CLEAN-O-MATIC** Parts Washer

- 1. No heating, no vapor
- Flush chips and dirt from metal parts with filtered solvent
- 3. Clean out blind holes and cavities
- 4. Do it thoroughly, fast and safely Send for catalog and prices

171,0 %. Lincoln Ave. Chicago 13, 111 GRAYMILLS CORP. For more data circle 510 on Postpaid Card

For more data circle 511 on Postpaid Card modern machine shop



start you on your way to top performance where a high pres sure lubricant is needed. You will be surprised to find how long it lasts. Get yours today in both oil and grease consistencies

#### TRIAL ORDER-TWO FOUR OZ. TUBES \$1.00

Send me my order of CMD right away! Sill me Bill my company	
Name	
Company Name	
Address	

City. State. Chicago Manufacturing and Distributing Co. 1910 West 46th St., Chicago 9, Illinois

CHICAGO MANUFACTURING AND DISTRIBUTING CO.

209

January, 1959

milling machines. In addition to permitting hexagonal, octagonal, square or other irregular external shapes from round stock, the unit also permits boring of internal matching irregular shapes. Therefore, perfect accuracy for internal or external tapered and matching pieces can be produced on the same machine. The tool box con-

trols a transversely operated toolholder by means of a rotary cam. As the piece turns in the lathe, the box travels along the piece and rotation of the cam causes the toolholder to reciprocate with the cutting tool.

For more data circle 89 on Postpaid Card

\* modern machine shop

#### DISC AND LOCKING HOLDER

Foster Supplies Co., 6122 Milwaukee Ave., Department MMS, Chicago

46, Ill., recently announced high speed Contur Flexible Abrasive Discs and Locking Holders with maximum operating speeds to 90,000 r.p.m., according to size.

Contur Disc Holders are precision made of aluminum and will wear indefinitely. The flexible discs are attached or removed by a twist of the wrist. Three point bayonet locking method and spring loaded centering pin on the holders engage the disc for perfect alignment and balance. They remain concentric with the grinder



SEIBERT FLOATING HOLDER

This holder, one of a long line of SEIBERT fine machine-tool accessories, provides a full float to compensate for misalignment of hole and tool when such operations as drilling, tapping, and reaming are performed. It also provides for holding close tolerances, it eliminates much downtime, and it permits quick tool changes. The float in all directions is not hampered by friction or binding in the driving mechanism when the tool is at work.

#### HEAVY-DUTY DESIGN ASSURES LONG LIFE

The heavy-duty design provides extra bearing capacity to assure long life, and the positive lubrication practically eliminates wear and parts replacement. All types of shanks are available in a range of sizes, in cluding an adjustable adapter shank.

Send for complete specifications and price information.



210

SEIBERT & SONS, INC. CHENOA, ILLINOIS

Quality MULTIPLE PHILL SPINDLES AND PRODUCTION TOOLS

For more data circle 512 on Postpaid Card



Contur Abrasive Disc and Locking Holder

#### FLYNN BORING HEADS



BORING HEADS FOR 40 YEARS
19 MODELS Write for catalog

FLYNN MANUFACTURING CO.

For more data circle 513 on Postpaid Card

# INSPECTION BY PROJECTION with the SCHERR PROJECTOR with the



VERTICAL DESIGN

NEW
IMPROVED
Self-Contained
MODEL
featuring

igid Place Base — aliminating fire charge for table Iting Stage for Halls, Angles of Bovols

4" Die, Shape Opening 14" Biometer Screen Galuma Silda adjastable for weer by means of gibs, Will beld squere indefinitely. Esstem mede Precision Casted conse: and deable condensors for different objectives. 10 to 1002 meanfilesties.

An entirely new practical draigned test for Inspection Superfeast and Production Shapertment and Produ

WRITE FOR
ILLUSTRATED FOLDER
CODE ORDST

GEO. SCHERR CO., Inc. COMPLETE LINE OF PRECISION INSTRUMEN

200-MM LAFAYETTE STREET • NEW YORK 12, N.Y.
For more data circle 514 on Postpaid Card

## "PRECISION" HOLE GAGE and SETTING FIXTURE



- Sets any hole size to .000025"
- Requires no rings or masters
- ♦ .005" direct-reading linear scale
- Priced to fit your budget

FREE BULLETIN (No. SSC-B1)

describes this amazingly different Gaging Set. Ask us for your copy!



SERVICE CORPORATION 7924-A Manchester Ave., St. Louis 17, Mo.

For more data circle 515 on Postpaid Card

SI-1058.1

MECHANICAL-RUGGED-PORTABLE Range .370" to 1.510"

mandrel at all speeds and will not wobble, vibrate or fly off.

Contur Flexible Abrasive Discs are available in popular grits of 24 to 320 and in six diameters;  $\frac{3}{4}$ , 1,  $\frac{11}{2}$ , 2, 3 and 4 inches.

High speed holders are made in three sizes to fit disc diameters listed. They are available with shank diameters of  $\frac{1}{8}$ ,  $\frac{1}{4}$  and  $\frac{3}{8}$  inch.

modern machine shop

#### AMPLIFIER-INDICATOR FOR EXTRA CLOSE TOLERANCE CHECKS

A gage assembly has been developed by Holmes Gage and Development

Corp., Columbus 3, Ohio, to permit many close tolerance checks, in the production room or on the inspection bench. that were formerly limited to the laboratory. Direct dial indicator readings in increments of 0.00002 inch are now possible by the combination of a rugged indicator gage with a mechanical amplifier. The instrument is also available for readings down to 0.0001 where less precision is necessary.

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## **EFFICIENT-LOW COST**

Dust Collection

Easy installation . . . efficient low-cost operation . . . simplified maintenance, make Dust-kop FIRST among equipment to collect most all industrial dusts. There are Dustkop models to eliminate your dust problems . . . that are space saving, self-contained units, or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.



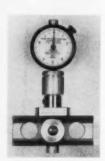
37 STANDARD MODELS TO CHOOSE FROM • READY TO USE



Also a Complete Line of Mist Collectors

AGET MANUFACTURING COMPANY

1398 E. CHURCH ST. • ADRIAN, MICHIGAN
For more data circle 516 on Postpaid Card



Amplifier - Indicator

212

The flush pin amplifier unit multiplies deviations from normal by five times and, thus, actuates the indicator to reflect fine readings.

The Holmes Amplifier-Indicator assemblies are precision built units and are available with two types of mounting bases, which can be readily adapted to various types of complementary tooling. Trouble free operation and accuracy were prime considerations of design.

For more data circle 91 on Postpaid Card



**DuCAS Flange Attached Fluid Transfer Gland** 

\* modern machine shop \*

#### **FLUID TRANSFER GLAND**

The DuCAS Corp., 1117 Douglas Ave., Providence, R. I., has introduced, and is currently marketing, fluid transfer gland drilling attachments.

These fluid transfer glands are equipped with high speed aircraft type Class 7 ball bearings and magnetic seals, which permit operation in the high r.p.m. and p.s.i. ranges. They have been tested and are guaranteed to operate at zero leakage, even when run at speeds to 15,000 r.p.m. and pressures to 1,500 pounds per square inch.

The DuCAS Flange Attached Model, shown in the accompanying illustration, has many features, one of which is that the entire housing, containing all of the sealing and operating



For more data circle 517 on Postpaid Card

components, may be removed from the one piece gun drill carrying shaft and flange. This enables the gun drill carrying shaft and flange to be permanently attached to the machine after a true indicator reading is established. This feature permits changes of bearings, seals or other necessary maintenance or repairs to the housing without curtailing production or disturbing the original installation true indicator reading. A standby housing can be slipped on to the flanged shaft, and tapered ground surfaces in the locking nose guarantee interchangeability and perfect alignment. Either standby or repaired housing can be installed in three minutes, keeping down time to a minimum without the need of reindicating for a true indicator reading. For more data circle 92 on Postpaid Card

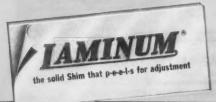
## SINGLE SPINDLE FULLY AUTOMATIC TRACING LATHE

Jones and Lamson Machine Co., Department 710, 521 Clinton St., Springfield, Vt., has introduced a rugged tracer lathe, the Model 30, which, combined with a choice of machine components, meets a wide range of specific turning requirements. It can accommodate one of two tracing units. One performs a single tracing cut in a fully automatic cycle, while the other unit provides two fully automatic tracing cuts with an indexing toolholder. Both units provide feed change during the cut.

One of two headstocks may be selected. Both of which provide automatic speed shift during a cut. One permits shifts between two speeds, while the other allows automatic shifting between four selected speeds. A choice of rear slides for facing, forming and turning are accommodated.

## Our Superiority Here...

Our superiority in the production of Laminated Shims of Laminum results in profitable advantages for manufacturers of aircraft, missiles and rockets, motors and engines, machine tools and similar precision-assembled products. With Laminum, they cut costs and turn out better assemblies, to close-tolerance accuracy, with no need for grinding—counting—stacking—miking. Laminum simply p-e-e-l-s to size, with no dirt between layers—ever!



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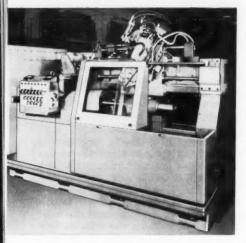
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Jones and Lamson Automatic Tracing Lathe

Other machine features are: extremely flexible controls, which can be

programmed from the operator's station; stylus and templates placed high and dry, free from chips or coolant; large unobstructed area for manual or automatic loading and chip disposal.

General specifications are 23 inch diameter swing over rails and 13½ inch diameter swing over the tracer slide. Diameter of work can range from ½ inch minimum to 8 inches maximum. Maximum length of work between centers can be 24, 48 or 72 inches.

For more data circle 93 on Postpaid Card

\* modern machine shop

#### CONTROL SYSTEM

Micro-Path, Inc., subsidiary of Topp Industries, Inc., Inglewood, Calif., now has available the Micro-Path Control System, which provides a means of recording complicated, continuous path machine tool movements

## .. Guarantees Superiority Here.

Actually, our Shims of LAMINUM are perfect precision STAMPINGS. Consequently, we have perfected our own special equipment, tooling, skills and techniques—all unknown to ordinary stamping shops. Result: the means to produce your precision STAMPINGS—in any contour, any size, any quantity "one to a million", at lowest possible cost. 3 exclusive Methods save you money...

Send for free booklet— "Service in Stampings".



Any one of these

## 3 METHODS

will economically produce Aircraft Quality Stampings—
"one or a million"—to your detailed specifications:

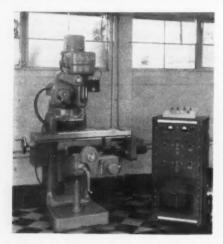
2. SHORT RUN
METHOD. Use
of low cost, short
run tooling, plus
special equipment produces
more than "just
a few." Quality
stays high—and
costs stay low.

1. MACHINE CUT just a few pieces –at experimental or pilot stage. No dies needed. Special techniques and equipment keep costs down.

3 PRODUCTION
Here is where
our special tooling applies to
great advantage. When dies
are needed,
charges are
moderate. Fast
delivery at lowestpossible cost.

Quality Shims and Stampings • 3301 UNION STREET, GLENBROOK, CONN.

For more data circle 519 on Postpaid Card



Micro-Path Control System is shown above applied to a Gorton Mastermil Machine

directly on magnetic tape — without use of the usual computer programming equipment. When played back, the device remembers all machine tool motions, issuing properly timed commands which duplicate each machining step, exactly as recorded.

The basic system can be applied to almost any existing machine tool, can be designed into new machines and can also be used in a wide variety of other control applications, such as transfer mechanisms, valve positioning, switch positioning, industrial drones, telemetering controls and so on.

For more data circle 94 on Postpaid Card

\* modern machine shop \*

#### CYLINDER HEADS MACHINED ON STANDARD PRECISION BORING MACHINE

The three spindle, single end, Style 771 Precision Boring Machine, manufactured by Ex-Cell-O Corp., Detroit 32, Mich., performs boring, plunge facing and chamfering operations on two different types of heavy tractor cylinder heads.

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The power and rugged nature of the setup will be appreciated because these surfaces, a total of 21, are machined from the rough casting in one pass, taking a depth of cut of between ½ and 3/16 inch.

After loading, the component is hydraulically clamped and the operator initiates the machining cycle. The table rapids to the left, the spindles start their rotation and the feed traverse commences. At the end of this stroke, the spindles stop and the table rapids out to clear the tooling. Due to close center distances on the component, the fixture has been designed to index and the operation is repeated on the second set of holes. Following the end of this feed stroke, the fixture and table both return to the starting position.

Four and six cylinder components are machined in this manner. Production in either case is 17 to 18 parts per hour.

For more data circle 95 on Postpaid Card



Ex-Cell-O Style 771 Boring Machine

#### SELF-LOCKING AND SELF-CLINCHING NUT

Penn Engineering and Manufacturing Corp., Doylestown, Pa., is offering an all metal, self-locking, self-clinching nut, for sheet metal fastening, that combines two essential functions in one lightweight unit.

The design employs a clinching ring which, when squeezing pressure is applied, causes the sheet metal to flow around a back tapered shank, secure-

by locking the fastener in the sheet with a flush fit on the reverse side. High torque and high pull out resistance are provided.

The self-locking feature offers lock nut design improvements, which contribute to ruggedness and retention of inherent flexing action of the semi-cirlocking jaws, guaranteeing against relaxation and loosening of the fastener in severe service and permitting the nut to be used repeatedly without diminishing its self-locking effectiveness.

Made in both steel (with vari-



PEM Self-Locking Nut

ous finishes) and stainless steel, these nuts are offered in a range of sizes for use in aluminum, magnesium, brass, copper and cold rolled steel sheets.

For more data circle 96 on Postpaid Card

modern machine shop

#### LINE OF CUTTING-OFF TOOLS

Portage Double Quick, Inc., 1041 Sweitzer Ave., Akron 11, Ohio, has

## The Ohio Knife Co. is offering machine tool builders and users amazing new hardened ways.

#### available in 7 standard cross sections in over sixty sizes.

By a time proven process, special analysis tool steel of any thickness is eternally bonded to a soft, tough, easily machinable steel, producing a superior way that will not warp or bow. Special O-KNI-CO hardening process (65-66 Rockwell C) to full depth of tool steel, along entire length of way, develops tremendous wear-resistant qualities, practically eliminating galling or scoring. The result is a continuing high degree of accuracy of the machine under even the severest work loads.

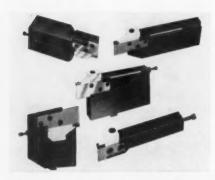


technical literature available.

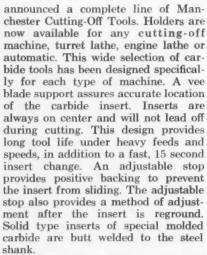
- ☐ HARDENED WAYS—Seven Cross Sections in over 60 sizes. SHEAR BLADES.
- ☐ SLITTING—A Basic Guide for the New Operator.

THE OHIO KNIFE CO., Cincinnati 23, Ohio, Dept. 73-HH

For more data circle 520 on Postpaid Card



Various Manchester Carbide Cutting-Off Tools

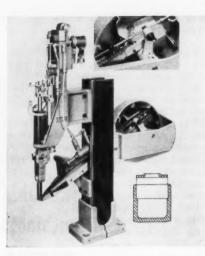


For more data circle 97 on Postpaid Card

★ modern machine shop ★

#### AUTOMATIC ASSEMBLY MACHINE IS IMPROVED

Dixon Automatic Tool, Inc., 2314 Twenty-Third Ave., Rockford, Ill., has



The Dixon Fully Automatic Auto-Positioner is shown here tooled to feed and place a 0.455 inch diameter formed washer into a cup, having 0.001 inch clearance (see cross section view). Inset shows feeder tooling as furnished for the job. Drum lugs deposit washers upon the specially formed loading tray, from which they fall to the feed track to travel with the formed side down. When reversed, they are automatically guided back to hopper.

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announced an improved Auto-Positioner, which essentially consists of the automatic parts positioning head and a newly developed parts feeder which positively guides the part into place. Both are mounted upon a dual column for compactness, rigidity and convenient adjustment and both are actuated by compressed air. An important feature of the feeder is that it requires no auxiliary motor or vibrator. No curved tracks are used and it is unnecessary to rely on gravity for placing the part in the chuck.

Designed to handle piece parts ranging from 1/16 inch to 2 inches in approximate size, the positioner automatically and positively transfers the parts from the feeder to the fixture at speeds up to 6,000 per hour.

For more data circle 98 on Postpaid Card



The Supreme Impact Wrench Chuck

#### IMPACT WRENCH CHUCK

Supreme Products Corp., 2222 South Calumet, Chicago 16, Il., now has available a chuck to hold the drill, so that an impact wrench can be made into an effective drilling tool. The Supreme Impact Wrench Chuck fits all ½ inch square drive tools and holds ½ to ½ inch drills. It features a keyless gripping action.

The manufacturer states that its new chuck has the ruggedness to withstand the shock created by impact power tools. At the same time, it will operate accurately and with minimum care.

For more data circle 99 on Postpaid Card

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## COMPARATOR CHECKS CLEARANCES TO MILLIONTHS

Checking of clearances between the i.d. and the o.d. of mating parts to millionths is possible with the Air-O-Limit Three Station ID-OD Clearance Comparator, recently introduced by Pratt and Whitney Co., Inc., 25 Charter Oak Boulevard, West Hartford, Conn. This comparator has been designed for checking precision mechanisms such as servo valves, where clearances are kept to a few millionths inch. It is a combination of two standard Model G (or Super G) Air-

O-Limit gaging units (one i.d. and one o.d.) plus a computing circuit. In operation, the output of the i.d. and the o.d. units is fed into a multifunction computing relay and the



P. and W. Air-O-Limit Clearance Comparator



#### SPEEDY - SAFE NON-POISONOUS

#### CASE HARDENING

Indispensable for Tool Rooms, Machine Shops, Schools, etc. Now available in 1, 5, 10, 25, 50 and 100 lb. containers. Write for Free Catalog

#### KASENIT CO.

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55 King St., Mehweh, N. J. For more data circle 521 on Postpaid Card

### CAMS

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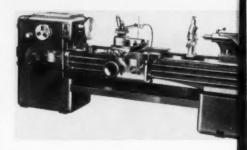
clearance or interference between the two parts is read on the clearance indicator in the center of the gage. The action of the indicators is fast and the dials are large, so that readings can be obtained quickly and clearly. For more data circle 100 on Postpaid Card

\* modern machine shop \*

## PRECISION LATHE FOR TOOLROOM AND PRODUCTION

The Index Industrial Corp., MM 150 Broadway, New York 38, N. Y., has announced the availability of the Sabre-All Geared Head Quick Change Flame Hardened and Ground Precision Lathe for both toolroom and production.

This gap bed lathe is arranged for direct multiple vee belt drive, electrical



19 Inch Sabre-All Geared Head Lathe

equipment and controls, and a built in electro magnetic brake for fast stops. This machine features a 6/8 h.p. motor; the all geared headstock has standard range 12 spindle speeds; roller bearings; hardened and ground gears; and continuous automatic lubrication.

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Conant offers com-

complete plete engineering and manufacturing facilities for your broaching needs. Expertly designed broaching for proper strength and chip carrying capacity. Prompt broach sharpening and reconditioning service service. Order standard keyway broaches from our stock.



For more data circle 523 on Postpaid Card

## PRECISION MACHINE VISE WITH ADJUSTABLE VEE SLIDES

Nichols-Morris Corp., 76-H Mamaroneck Ave., White Plains, N. Y., has announced the Ellis Machine Vise, which incorporates adjustable vee slides for accuracy and long life. It has been designed for use on milling



Ellis Vise has adjustable vee slides

machines, drill presses, planers,

shapers or grinders.

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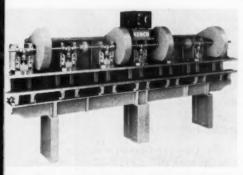
The Ellis Vise features: one piece, semi-steel body casting; solid vee ways, precision fitted, with adjustable and renewable gib; hardened and ground alloy steel jaws, 5 by 1¾ inches; alloy steel screw with precision ground threads; replaceable manganese bronze nut; plain or swivel base, graduated 360 degrees; and low overall height.

For more data circle 102 on Postpaid Card

\* modern machine shop

#### LIGHTWEIGHT PUNCH PRESSES

A new concept in punching, forming, blanking or bending of long extruded metal strips has been developed by the Kenco Manufacturing Co., 5211 Telegraph Rd., Los Angeles 22, Calif., with the introduction of its Mark VII. This machine consists of seven five ton punch presses mounted on one common high tensile sorbitic ribbed-style platen, which provides the rigidity necessary for precision punching. The use of extremely long die plates can be employed, due to the synchronization of the rams and the distribution of power throughout the entire length of the machine, which eliminates tortional twist to the crank-



Kenco Mark VII Five Ton Punch Presses

shaft. The plates can be arranged to accommodate any number of dies or positions within the area of the die plate.

The machine is equipped with the Electro-Safe motor, controls and drive. Controls for the unit can be installed in any sequence to accommodate any number of operators required for the job. Each operator must apply both hands to actuate the press and must release both hands before the succeeding stroke can be actuated. The electronic control of this unit can be designed to synchronize all auxiliary equipment that may be working in conjunction with the Kenco Mark VII. The control instantaneously selects continuous operation, single trip, foot control or inching.

For more data circle 103 on Postpaid Card

\* modern machine shop

#### IRON POWDER ELECTRODE

The Lincoln Electric Co., Department 3522, Cleveland, Ohio, has introduced Manjet, which is an electrode that has been designed to reduce the cost and provide easy operation in welding 12-14 percent manganese steels. The electrode is suitable for building up manganese steel hardsurfacing deposits on either manganese or carbon steels and, also, for making sound joints between two manganese steel parts or between manganese and carbon steel parts.

Manjet is a low hydrogen, iron powder electrode that has high deposit rates, smooth beads and a steady arc. It is used with both a.c. and d.c. welding machines. Available in 5/32, 3/16 and ½ inch sizes, the manufacturer claims that Manjet electrodes deposit about twice as much weld metal per electrode as conventional, non-iron powder electrodes. Each ¼ inch electrode will cover 9 square inches with a deposit ½ inch thick. For more data circle 104 on Postpaid Card

#### DRILL GRINDER

The addition of a heavy duty model to its No. 21 Drill Pointer line has been announced by Oliver Instrument Co., 1430 East Maumee St., Adrian, Mich. This model will permit extension of drill size range for the Oliver



for FAST, LOW COST



SAWING

LAPPING

USE KELLER
DIE FILERS

ECONOMY Model F256 has rugged table that tilts 12° in four directions, improved fast acting file chuck, two speeds. \$109.50° STANDARD Model F256A same as Economy model

plus #10 file roller support arm and mounting bracket. \$131.50\* DELUXE Model F256B with overarm, \$149.50\*

Ask your KELLER Dealer or Write for Bulletin 256.

\*All prices F.O.B. Eau Claire, Wisconin

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For more data circle 525 on Postpaid Card



Oliver of Adrian Drill Grinding Machine

point which, until now, has been available only on the No. 510 Drill Pointer which has a maximum capacity of three inches in diameter. This drill grinding technique permits a more intensive clearance angle on the point as the drill web is approached.

While basically the same as its standard companion, the heavy duty No. 21 Drill Pointer utilizes ball bearings in conjunction with a special, cam operated stud. This controls horizontal motion as the drill moves across the grinding wheel face to produce the desired point. Capacity of the machine is identical with the standard model, 3/32 to ½ inch. Included as standard equipment is the ¼ h.p. motor, grinding wheel, diamond dresser, jaw assemblies and setting gage.

For more data circle 105 on Postpaid Card

\* modern machine shop

#### ROUGHNESS METER

The Cleveland Instrument Co., 6220 East Schaaf Rd., Cleveland, Ohio, has announced the development of the Cleveland Roughness Meter. The



Cleveland Precision Roughness Meter

widest range of surface shapes (outside diameters down to 0.030 inch, inside as low as 0.25 inch) can be measured with the basic equipment; no additional adaptors or accessories are required. The basic roughness meter consists of pickup, amplifier and handle. It may be operated hand held or with power trace. Readings are

unaffected by temperature, humidity and/or magnetic fields.
For more data circle 106 on Postpaid Card

\* modern machine shop

#### THREE ARM REEL HANDLES STEEL AND TIN PLATES UP TO 15,000 POUNDS

The F. J. Littell Machine Co., 4101 North Ravenswood Ave., Chicago 13, Ill., has introduced a motor driven reel and loading car combination, which is ideally suited to the requirements of users of heavy coil stock of steel and tin plate.

Ease and simplicity of operation are features of both loading and unreeling. In loading, the loading car holding the new coil raises the coil to the proper height for alignment with the axis of the reel spindle. The car then moves on tracks toward the collapsed arms of the reel. As soon as



a new concept in thread gaging!

#### THE FOSTER GAGE HANDLE

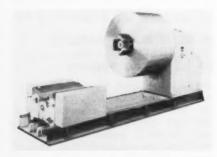
Now, for the first time, it is possible to inspect tapped holes fast, without sacrificing gage life or operator "feel" and speed control with the new Foster Gage Handle.

When gaging, the entire weight of the Foster Handle is **suspended** at all times while in **motion**. And while the gage is in motion, it is impossible for the operator to rest his hands upon it.

For a demonstration, write to us for the name of the authorized distributor in your area.

C. E. FOSTER GAGE CORPORATION
5341 ENGLISH AVE. INDIANAPOLIS, IND.

For more data circle 526 on Postpaid Card



Littell Reel and Loading Car Combination

the coil is in position on the arms, the loading car is lowered and the three arms of the reel expand hydraulically to perfect center the reel and hold the coil. The unit is motor driven, through a 5 h.p. variable speed drive, which supplies the stock at the exact speed that is required. These reels take coils up to 15,000

pounds of 54 inch maximum o.d. and 36 inch maximum width. The arms expand from  $14\frac{1}{2}$  to  $17\frac{1}{2}$  inches. The 15,000 pound capacity loading car has a vertical lift of 16 inches. Floor space complete with bed and track way is 40 by 152 inches.

For more data circle 107 on Postpaid Card

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#### WORKHOLDING FIXTURE FOR PRODUCTION MILLING

Known as the "Autogrip," an unusual workholding fixture for production milling operations has been announced by Wharton Unitools, Valley Stream, Long Island, N. Y. Available in a single bank hand closing model, as well as a double bank model with pneumatic closing, the fixture has been designed to accommodate workpieces from 1/4 inch to 2 inches in diameter in quantity. Workpieces are positioned close together, thereby

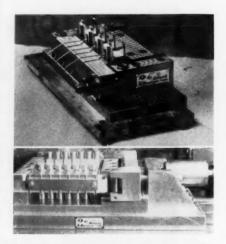


Use these Handy PORTABLE ELECTRIC RECIPROCATING TOOLS for Greater Production, Better, More Uniform Work — All with less Operator Fatigue. Fixed strokes are ½" or ½" long. Operate on 110 Volts AC-DC. Deliver 1000 PUSH-PULL strokes per minute. Try one of these tools on your next job.

Send for Descriptive Literature.

ACME TOOL CORP. 73 W. Broadway New York 7, N. Y.

For more data circle 527 on Postpaid Card 224 modern machine shop



(Top) Single Bank Hand Closing Model Autogrip Workholding Fixture. (Bottom) Double Bank Autogrip with pneumatic closing

taking maximum advantage of the milling cutter throughout its travel.

The Autogrip utilizes a roller grip system which equalizes pressure on each workpiece, automatically compensating for any variation in diameter. Workpieces are automatically located against a datum face and held by three point contact. Designed for easy cleaning, the fixture is constructed to reduce loading time to an absolute minimum.

For more data circle 108 on Postpaid Card

\* modern machine shop 🖈

#### CRANKSHAFT LAPPING MACHINE

A crankshaft lapping machine, which produces fine surface finishes by means of coated abrasive strips, has been developed by Norton Co., Worcester 6, Mass. The No. 31 Crank-O-Lap Crankshaft Lapping Machine has been designed for low cost production of fine surfaces on external diameters of automotive type crankshafts. It laps pins and bearings simultaneously in an automatic cycle to low micro inch readings for im-



Norton No. 31 Crankshaft Lapping Machine

provement of crankshaft service life. Although developed to finish crankshafts, the machine is also suited to improving the finish on other types of parts.

Base of loading and unloading is one of the special advantages of the No. 31 Crank-O-Lap Lapper. The head and foot stocks are carried on a swing frame mechanism. This swings the head and foot stock out at hand high level to the operator, thus avoiding the need for strain or reaching, an important consideration when handling such relatively heavy parts as crankshafts.

For more data circle 109 on Postpaid Card

\* modern machine shop

#### HOLE CENTER FINDER

James Products Co., 801 Mentor Ave., Mentor, Ohio, has announced a tool for fast accurate spotting of hole centers. In one simple operation the tool transfers the location of a hole,



January, 1959

modern machine shop

225



The James Hole Center Finder

establishes the center point of the hole and marks the point for easy drill location.

The tool comes in kit form, consisting of one center punch made of hardened and ground tool steel and eight sleeve plugs. Sizes range from 5/16 to 3/4 inch. Sleeve plugs are 1 inch long. All plug diameters are held to plus or minus 0.001 to allow for precise and accurate layout work.

The hole center finder kit is said to be ideal for every toolmaker, machinist, maintenance man, machine builder and layout man, wherever holes have to be transferred accurately. It has been designed for use on metal, plastic and wood or any other piece of material where locating of center positions for drilling or calibrating is involved.

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#### AIR-HYDRAULIC UNIT

The Electro-Mechano Co., 265 East Erie St., Milwaukee 2, Wis., has announced an air-hydraulic unit which is unique in that it combines an air cylinder, a hydraulic control cylinder and a valve arrangement which will allow rapid advance, feed and skip feed in any combination. This compact unit is said to be ideally suited for automation of existing machines.



The Electro-Mechano Air-Hydraulic Unit

Two easy to reach movable cams make it possible to set up any combination of fast, slow and skip feed strokes. A built in bypass valve with traveling rods allows rapid advance to any point in the stroke, controlled rate of feed for any distance, pickup to rapid feed and return to controlled rate. This cycle can be repeated several times during the stroke by merely setting the bypass valve cams. The controlled feed is during the outward stroke. The inward stroke has continuous fast feed for rapid retraction.

Made in sizes of 2 and 3 inch bores, the Electro-Mechano Air-Hydraulic Unit is available in 2, 4, 6 and 8 inch stroke lengths. The 2 inch bore gives a thrust approximately three times the air line pressure. The 3 inch bore gives a thrust seven times air line pressure.

For more data circle 111 on Postpaid Card

\* modern machine shop

#### DRILLING AND TAPPING ATTACHMENT

A multiple spindle drilling and tapping attachment, called the Dumore Multi-Drill, has been added to its line of drilling equipment by The Dumore Co., 1302 Seventeenth St., Racine, Wis. This attachment is supplied for use with the Dumore Series 24, 26 and 28 Automatic Drill Units and has been expressly designed to increase production on drilling and tapping operations.

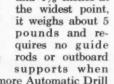
Each spindle has a drilling capacity up to ¼ inch in steel. Spindles rotate

from a fixed point and can be adjusted to reach a 37/8 inch maximum bolt circle, while the minimum center distance is 7/8 inch. Quick, easy change of hole pattern is possible by merely loosening the spindle locking nuts. swiveling the spindle into position and relocking.

The manufacturer claims that every component, from the heat treated alloy steel drive gearing to the aluminum alloy housing, has been designed to

withstand hard usage of production work. Standard gear ratio is 2.2 to 1 with a 4,000 revolutions per minute maximum recommended spindle speed. Measuring only

9-3/32 inches high and 47/8 inches at



Dumore Multi-Drill used with the Dumore Automatic Drill For more data circle 112 on Postpaid Card

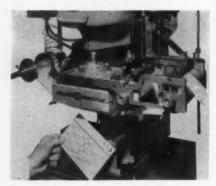
modern machine shop

#### TWO COLOR MARKING HEAD

A two color marking head has been announced by The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. It features independent feed adjustment for each of two different roll leaf colors and has been intended for use in the Model 250H Pneumatic Power Hot Stamping Press, but is adaptable to use in other types of hot stamping presses. This head, which may be supplied for an existing application



For more data circle 529 on Postpaid Card modern machine shop 227



The Acromark Two Color Marking Head

or for a standard Acromark Press, incorporates the two color roll leaf holder, guide, dual feed roll and adjustments, complete in one unit.

Each roll leaf feed may be set independently and with a 4 inch press stroke. The maximum amount of roll leaf feed on one advance is 6 inches and the other advance is 8 inches. Roll leaf up to 7 inches wide may be accommodated for a single color, or two color rolls totaling 7 inches in width, may be used. The maximum die area is 7 by 8 inches when a solid engraved die is used. In addition to multi-color application, the use of the dual feed advance will effect economies on single color copy where a portion of such copy requires a slight pull and the bulk of the copy requires a much longer pull of the roll leaf.

The head is equipped with interchangeable cartridge heaters, totaling 660 watts for 115 volts, capable of delivering temperatures up to 550 degrees F., this being controlled by a Robertshaw Controller with dial type setting and pilot light to indicate



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TOOL AND DIE CORPORATION 1823 North 32nd Avenue
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modern machine shop

January, 1959



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current on-off cycle. Equipment can also be provided with a Wheelco Temperature Controller of the proportioning type which will give unusual accuracy.

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\* modern machine shop

magnetism from invading the machine table and ways. In the "off" position, the chuck is completely demagnetized.

The Walker 1224 Chuck is entirely suitable for milling and planing. During these operations, the cutting tool is automatically subjected to a demagnetizing influence during the cutting cycle, because the magnets are polarized horizontally, rather than vertically. This allows free cutting

#### PERMANENT MAGNETIC CHUCK

O. S. Walker Co., Inc., Worcester 6, Mass., has announced a permanent magnetic chuck which is 12 by 24 inches. This Walker 1224 Chuck incorporates ceramic magnets. The bar poles, only ¼ inch wide, give uniform holding over the entire chuck top. Workholding ability is excellent, even on very thin parts. Secondary external fields are controlled to prevent



Walker 1224 Permanent Magnetic Chuck

without chip interference and, thus, eliminates the danger of scored surfaces and broken cutters, resulting from chip adherence.

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\* modern machine shop 1

#### COLD HEADING MACHINE

The Robert E. Morris Co., REM Sales Division, 5004 Farmington Ave., West Hartford 7, Conn., recently introduced the Omega "OO" Cold Heading Machine, designed for quick and accurate cold heading of miniature parts.

Electrical contacts, rivets, pins and similar parts, as small as 0.012 inch diameter by 0.016 inch long can be produced on the machine. The Omega "OO" is a standard solid die, double stroke heading machine which will cut to length, head and form between 80 and 120 pieces per minute, all to extremely close tolerances. The maxi-



The Omega "OO" Cold Heading Machine

mum wire diameter accommodated is 0.070 inch with most alloys and up to 0.120 inch with soft aluminum. Part lengths may range from 0.016 to 0.400 inch. Hollowing of rivets, as well as heading, may be performed in one operation. The depth of the hole, depending upon the material being used, is equal to three times the wire diameter in aluminum and 1½ times in copper and brass.

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#### LINE OF AIR GAGING CAPSULES

A line of air gaging capsules has been developed by the Taft-Peirce Manufacturing Co., Woonsocket, R. I., for increasing the scope, improving the accuracy and, also, reducing the cost of many types of inspection jobs requiring high magnification gaging equipment.

The air capsule is a small, air actuated pickup of the direct contact type. It can be used with any Taft-Peirce CompAIRator Air Gage to provide fast visual readout with quick response. Extreme accuracy is claimed to be possible because of the high magnifications available in the CompAIRator. In addition, the air capsule is available in a special long range model, which has been designed for wide tolerance gaging, having a range

of 0.004 to 0.040 inch. The air capsule comes in both plain and threaded body types and measures only 1½ inches long by 0.375 inch in diameter.

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The small size and versatility offered by this air capsule makes it an ideal, low cost size sensing element, which can be readily adapted to a wide range of gaging, including special



The Taft-Peirce Air Capsule in use

tooling, fixturing, machine control and process control applications.

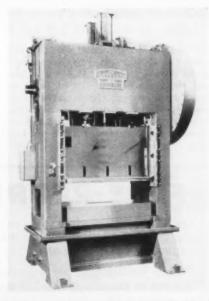
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#### DOUBLE ECCENTRIC PRESS HAS 200 TON CAPACITY

High speed, uninterrupted production is made possible with a versatile 200 ton capacity double eccentric press, which was recently introduced by The Cleveland Punch and Shear Works Co., East 40th and St. Clair Ave., Cleveland 14, Ohio.

Operating at a speed of 50 to 150 s.p.m., this press has a bed area of 36 by 54 inches, a 4 inch stroke of the slide with a 2 inch adjustment. The distance from the bed to the slide with the stroke down and adjustment up is 20 inches. Ruggedly built for high speed production without interruption, this press features four piece



Cleveland 200 Ton Double Eccentric Press



tie rod construction. The slide is provided with power adjustment and is air counterbalanced. It has a single end drive and is equipped with a drum type friction clutch, electrically controlled with spring loaded brake. Built for safe, efficient operation, this press has all gears and drive mechanism completely enclosed and an auxi-

liary air brake on the flywheel to insure a quick stop. For more data circle 117 on Postpaid Card

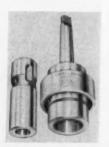
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## CHUCK DESIGNED FOR QUICK TOOL CHANGES

A quick change tool, called the Magic Chuck, which gives multiple spindle versatility to single spindle drilling machines, has been announc-

ed by Seibert and Sons, Inc., 1001 East 24th St.. Chenoa, Ill. It requires only seconds to change from one tool to another with this holder, making it especially valuable where such operations drilling, reaming and tapping are done in succession.

The Magic Chuck is made in five sizes with A.S.A. or Morse Taper shanks and with holes to accommodate collets having an o.d. of from 11/16



H

Magic Chuck and quick change collet

## FREE REPRINTS

The following reprints are available free of charge in limited quantities upon letterhead request to this magazine:

"Machine Tool Distributing and Engineering Services"

"Grinding Jet Blades by Abrasive Belt Method"

"Heat Treating-Should You Do It Yourself?"

"Industrial Distributors-Their Vital Service to Industry"

"Forming Aerodynamic Structures"

"Modernize Your Shop and Save Money"

"Producing Critical Airplane Control Components"

"Chill-Shunt Tooling in Tungsten Arc Welding"

"How and Where To Use Hydraulic Tracers"

"Relief Grinding Twist Drills for Spotfacing"

"Help-When You Need It"

"Milling Applications Unlimited"

"Converting a Grinder to Increase Production"

"How to Guarantee Your Own Success"

"Relief Grinding Twist Drills for Spotfacing"

"Magnetic Chuck Facilitates Drilling Operations"

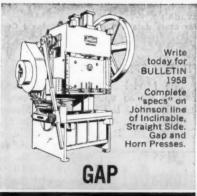
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This book explains how foremen and executives may analyze their jobs and apply correct methods of handling supervisory problems encountered daily in their work.

supervisory problems encountered daily in their work. Clearly and concisely it covers all the typical jobs of hiring, reprimanding, firing, getting cooperation, delegating authority, training workers, etc. Revised to incorporate modern problems facing supervisors, this Fourth Edition includes information on such matters as automation, communication needs, and present-day stresses in human relations.

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#### True Conical Grinding on a S T E R L I N G Drill Grinder gives you Faster Cutting Drills and More Holes per grind

Conical grinding of a drill point produces the same clearance angle from O.D. to web. The drill enters the work easier, cuts a uniform chip that requires less pressure, less power.



90°—140° Included angle with variable clearance angle set with built-in gage on all 2, 3 & 4 flute drills from 1/8" to 21/2" diameter.

Set-up is simple and fast because no chucks or collets are used. Built-in diamond wheel dresser produces a finished cutting edge that stands up longer. You get more, accurate holes with drills ground on a STERLING "DV".

Ask your STERLING Dealer for complete information on all STERLING Drill Grinders or write direct

## McDONOUGH MANUFACTURING CO.

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inch to 2% inches. Quick change collets have standard tapered holes. Others are available with straight holes up to  $\frac{1}{2}$  inch for taps, reamers and so on, having square ends. Collets that use bushings with any size of hole up to  $\frac{5}{16}$  inch for drills and taps can be furnished, and centered

collet blanks and specials are also available.

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#### FIFTEEN SPINDLE DRILL HEAD

The Model 3-22 Multi-Drill, with two to fifteen spindles, was recently introduced by the Commander Manufacturing Co., 4224 West Kinzie St., Chicago, Ill. It has a drilling area

of 3 by 22 inches, which can be extended up to  $35\frac{1}{2}$  inches with standard extension spindles. The unit can be mounted on any drill press.

Designed for applications requiring the drilling or tapping of up to fifteen holes in any pattern on a rectangular area from 3 to 351/2 inches, the Model 3-22 is equipped with universally adjustable locating arms, heavy duty universal joints and antifriction bearings.

Twin guide rods, located at the rear of the



Commander Model 3-32 Multi-Drill

## **Make Your Press Almost Automatic!**

FOR PUNCHING, RIVETING.

Now you can get a finished

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World's largest

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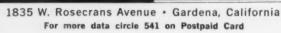
assembly operation with

every revolution of the

part or perform an

The new benchmaster Dial Index Feed

extreme operator safety and at strokes up to 280 per minute! Choice of 12" or 15" tables. 10 or 12 stations. LOW HEIGHT - only 23/8" overall ... allows greater use of press shut height, more space for tooling! Repeats accurately, 220° dwell between indexing for ample tool engagement and withdrawal. Attaches directly to bolster area. Can be used with Benchmaster Automatic Friction Roll Feed. All wearing parts heattreated. Special dropoff provided for in mounting base. Fits Benchmaster presses and most others.



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MODEL NO.	FIRING CHAMBER (H.W.D.)	PRICE (300° to 2000°)	PRICE (400° to 2300°)
P46 P79 P918 P414 P124 P818 P136	4½"x4½"x8" 6"x6"x9" 9"x9"x18" 14"x14"x14" 12"x12"x24" 18"x18"x18" 18"x18"x36"	\$90.00 \$205.00 \$480.00 \$525.00 \$715.00 \$775.00	\$110.00 \$225.00 \$528.00 \$603.25 \$822.25 \$887.50 \$1312.50

Automatic Controls Available on all Models



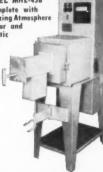
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- Infinite zone tempera-ture control
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- Patented element holders
- Infinite variety of timetemperature curves ob-
- Rugged construction

"ATMO-CARB" MODEL MHE-458

Complete with Carburizing Atmosphere Generator and Automatic Control



\$1325.00

Other Sizes and Arrangements Available

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unit, permit free vertical movement of the head and insure accurate repetitive drilling and tapping.

Maximum capacity of the unit is  $\frac{3}{8}$  inch in steel. Minimum center distances as close as  $\frac{1}{2}$  inch are possible. The Model 3-22 can be used for multiple tapping with the addition of a motor reversing unit.

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The Quick-Tilt Mattison No. 24 Vertical Spindle Rotary Surface Grinding Machine

modern machine shop

## ROTARY SURFACE GRINDER FEATURES QUICK-TILT SPINDLE

A quick-tilting device, for creating wheel clearance on vertical spindle rotary surface grinders, has been announced by Mattison Machine Works, Rockford, Ill. This feature makes it

possible to convert from rough to finish grinding in seconds, so that advantages of both high stock removal



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and flat grinding can be fully realized

on every job. One of the problems in grinding for stock removal has been the time consuming adjustments necessary to tilt the spindle in order to eliminate wheel drag. The quick-tilt spindle simplifies the problem because every chuck load can be rough ground first, using an arbitrary 0.010 inch wheel tilt. Location of the low point makes no difference as long as there is stock available for finishing. In seconds, the spindle can be returned to the vertical position and a light finishing cut taken to produce perfectly flat parts. A selector switch on the column actuates an air cylinder that automatically tilts the wheel head and spindle toward the work, or back to dead flat. Then, after reducing the rate of downfeed

slightly to keep power draw at the optimum, the machine is ready for the finishing cut and sparkout.

The quick-tilt spindle is optionally available on all Mattison No. 24 and 36 Vertical Rotary Surface Grinders. For more data circle 120 on Postpaid Card

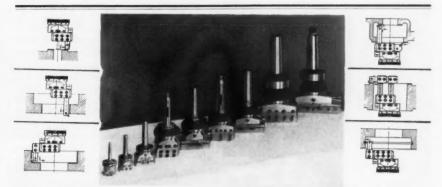
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#### PRECISION JIG BORER

Moore Special Tool Co., Inc., 730 Union Ave., Bridgeport 7, Conn., recently introduced its Model No. 3 Precision Jig Borer.

This machine has a greater range and larger table than its No. 1 and 2 predecessors — 11 by 24 by 20-13/16 inches. It incorporates much of the experience gained from these two models. This includes the traditional feature of accurate lead screws.

With the No. 3 Jig Borer, the locating, boring, drilling and reaming of



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- · Automatic Feeds
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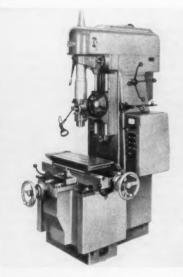
THE CAPEWELL MFG. CO.

MARTFORD 2, CONN.

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new shop equipment . . .



Moore Model No. 3 Precision Jig Borer

holes in dies, jigs and production parts can now be accomplished with an accuracy finer than the present limits of the tenth.

Some of the features of the No. 3 that contribute to its extreme accuracy include: hardened, precision ground, hand lapped steel ways, which eliminate gibs and overhang; a wide speed range, 60-2,250 r.p.m.; large working table surface, 11 by 24 inches, with 20-13/16 inch height allowance; micro setting of vernier dial; more accessible cross clamping; centralized controls for spindle speeds and feeds; quick setting precision lead screws; and J.I.C. conformity.

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#### COOLANT GENERATOR

The Model 2RH Two Gallon Mistic Mist Generator, a product of Aetna



Aetna Model 2RH Mistic Mist Generator

Manufacturing Co., 175 South York Rd., Bensenville, Ill., features a lead coated rectangular tank, removable covers for simplified cleaning and refilling and an exterior sight glass for visual coolant level indication. Cleaning and refilling is accomplished without disconnecting the shop air line.

The unit is compact, constructed of heavy gauge, lead coated steel and finished in red and gray hammer tone enamel. The extremely compact stainless steel nozzle (3/16 inch diameter) is secured to a plastic covered 60 pound magnet. Unique friction type universal joints will not tighten or loosen once they have been set. This permits easy nozzle repositioning. Mistic Mist Coolant Generators can be used for all types of machining operations.

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#### FLEXIBLE TOGGLE CLAMPS

Flex-o-matics, a series of flexible toggle clamps which features unique concepts in clamping tools, have been

## **NEW Box Table**

REPLACE YOUR BROKEN-OUT TABLES
AT A MINIMUM COST

Size: 30" x 24" x 20". 500 Lbs. Side: 30" x 12", with 3/4" t-slots. Price: \$325.00, f.o.b. factory.

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50 E. 12th ST.

OSWEGO, NEW YORK

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announced by Detroit Stamping Co., 349 Midland Ave., Detroit 3, Mich. These clamps are die cut and formed from high carbon steel. Stainless steel rivets are fitted into burnished pivot holes.

The Flex-o-matic Series consists of six models, four of which feature tempered flat spring action jaws to



De-Sta-Co Flex-o-matic Toggle Clamps

provide for automatic compensation of material thicknesses from preset dimension to a recommended additional 3/8 inch jaw gap. Two of these four models—the 420 and 421—have preset 0 inch jaw gap, requiring no

adjustment spindle. The other two — 421-1 and 421-2 — combine automatically adjusting flat spring action with standard De-Sta-Co screw type spindle assemblies.

The other two models—the 431-1 and 431-2—do not have the feature of automatic compensation for material thicknesses, but provide conventional clamping action with up to 350 pounds holding pressure.

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## **MODERN MACHINE SHOP**

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#### ADAPTER FOR GRINDING FIXTURE

Harig Manufacturing Corp., 5765 West Howard St., Chicago 31, Illinois, has announced a ball seat punch



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Adapter for Harig Grind-All Fixture

adapter, which is a precision attachment that locates and clamps ball seat type punches in the Harig Grind-All Fixture. The nib of this adapter accurately locates the ball seat type punch in the same relationship as it will be in the punch holder.

This adapter attachment is hardened and ground throughout. It is available with ½, 5/16, ¾ and ½ inch nibs to fit these respective ball seat

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#### CENTER IMPROVES WORKHOLDING EFFICIENCY

A recently developed combination of a completely new type of driving center and live center provides an effective method of holding material between centers for turning and grind-



R. B. Tool Center has hydraulic control

January, 1959

## THE BEST

PORTABLE

#### **ELEVATING TABLE**

YOU CAN BUY ...

(Eliminates Cranking)



2000 LBS. OR \*1000 LBS. CAPACITIES
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#### A precision made MIDWEST TABLE Costs no more!

- It's hydraulic . . . positions work or feeds at desired height without use of hands
- Rigid cast construction
- Top turns 360° and clamps
- Foot release valve to lower
- Machined top surface can be used as work table.
- Roller bearing casters with ball bearing swivels
- Floor clamping available extra

Write today . . . specials on request

## **MIDWEST**

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ing. Available from R. B. Tool Co., Inc., 17 Roff Ave., Palisades Park, N. J., this combination includes a hydromechanical driving center and a compensator live center with a built in pressure gage. Hydraulic control permits an effective grip of pins on material and will balance surface irregularities up to 1/4 inch. The center point of the driving center is spring loaded, independent of the hydraulic system, to provide high accuracy of concentricity. Interchangeable driving pins in eight different sizes permit the clamping of material from 1 inch to 10 inches in diameter with but one driving center.

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#### VERTICAL MILLER DESIGNED FOR SPIRAL MILLING

Index Machine Co., 544 North Mechanic St., Jackson, Mich., has introduced a vertical milling machine which makes it possible for the most modest shop to be equipped for spiral or helical milling. This machine uses end mills, rather than special milling cutters. The finish obtained is claimed to be excellent, since a manually compensated nut on the lead screw enables climb cutting to be employed in the spiral milling operation.

The machine is automatic and two options of cycle are supplied. The unit incorporates a dividing head, geared to the table feed, and rapid traverse return. The range of lead per revolution of workpiece is from 0.536

DOUBLE CRANK O.B. I.



# WITH NEW ELECTRICALLY CONTROLLED AIR CLUTCH

- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES







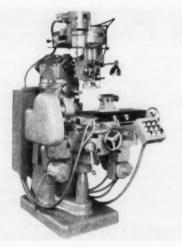


## SERVICE MACHINE CO.

Mfrs. of Rousselle Presses
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ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS

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Index Vertical Miller for spiral milling

inch minimum to 64.500 inches maximum. Any lead normally obtainable

with a dividing head is available. Helix angle required is obtained by tilting the head.

An advantage of the automatic cycling arrangement is that it is unnecessary to disconnect or remove it to use the machine for regular milling, drilling or boring operations. Removal of the equipment is quick and easy, however, in the event scheduled operations indicate no spiral milling requirements for a long period of time. For more data circle 126 on Postpaid Card

\* modern machine shop

#### RIGHT ANGLE ATTACHMENT FOR SPINDLES

The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio, has announced the development of two right angle attachments for its line of Super Precision Motorized Milling Spindles, ranging in size from 1 to

- High indexing accuracy
- Exceptional levelness
- Accurate center bore concentricity

. . . the WALTER Precision-Dividing Rotary Table

Circular milling operations which require precision indexing call for WALTER Rotary Tables:

- Easy to read scale with adjustable zero mark. Reading to 6 seconds.
- Precision-ground worm gear in oil assures long-lasting indexing accuracy.
- Ground worm spindle is deeply nitrided for maximum hardness and freedom from wear. No backlash in worm wheel.
- Large graduated drum on worm wheel enables fine setting.
- Clamping levers provide rigid table locking without affecting index setting.



**WALTER Rotary Tables** come in 10'',  $12\frac{1}{2}''$ ,  $15\frac{3}{4}''$ ,  $19\frac{3}{4}''$ , 25'' and 31'' sizes; with and without dividing discs.

FREE! For illustrated catalog, technical data and test reports, write today. ▶

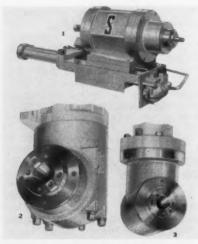


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Right Angle Attachment for milling spindles

200 h.p. In the illustration, Item 3 is an accessory for Item 1. Item 2 illustrates the right angle attachment with No. 50 NMTB nose, while Item 3 shows the attachment with a No. 30 or 40 NMTB nose.

Each type and size of milling spindle has the conventional NMTB nose. When the right angle attachment is applied, the nose of the spindle accommodates the NMTB arbor, serving as the driving shaft of the attachment. The attachment can be positioned at any 90 degree location.

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## MACHINE PERFORMS PRECISION MILLING AT ANY AND ALL ANGLES

Sundstrand Machine Tool Co., 2539 Eleventh St., Rockford, Ill., has an-

# 1500° in 5 minutes 2300° in 30 minutes

Johnson NUMBER 120 HI-SPEED FURNACE

That's the kind of quick heating action you get with this compact, powerful furnace. It's economical to operate, too. Fast heat-up saves time and gas. High-temperature insulated fire-box, 5" by 734" by 13½" gives even hardening of high speed and carbon steel dies, tools, and small parts. Temperature easily regulated. G.E. motor and Johnson Blower included. 120,000 BTU's per hour.

Pedestal style, F.O.B. Factory \$184.00 No. 120 also available in bench style. Write today for free Johnson catalog

JOHNSON GAS APPLIANCE COMPANY 571 E Ave., N.W., Cedar Rapids, Iowa

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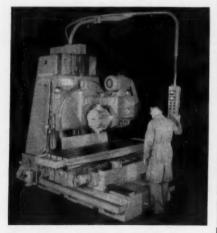
nounced its Omnimil, which not only combines the rigidity of a heavy duty miller with the range of a boring mill, but also adds the versatility of an all angle head. The double spindle head can be adjusted to any angle, thus minimizing the amount of work handling required when milling a workpiece that requires machining surfaces in a number of planes.

This machine has the capacity to take sizable cuts with its 15 h.p. double spindle head. The low speed spindle for ferrous material has a speed range of 25 to 400 r.p.m. and the high speed spindle for machining non-ferrous materials has a range of from 250 to 4,000 r.p.m. Both spindles

have quick speed changes.

Among the operations that are readily handled on the Onmimil are: angular, cross, end and slab milling, drilling and boring. Power feed rates are infinitely variable between ½ and 200 i.p.m. for longitudinal and transverse feed, and ¼ to 100 i.p.m. for vertical feed. Unusual accuracy in setup is provided by pendant control that permits positioning control of less than 0.001 inch.

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Overall view of the Sundstrand Omnimil

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A typical Desmond Huntington grinding wheel dresser costs about \$2.70 from your distributor, yet it substantially increases grinding production, makes wheels cut better, and lowers grinding costs. By dressing all your grinding wheels regularly you remove inefficient dull particles and loaded metal, expose a fresh new grinding surface. Your Desmond distributor can furnish the exact model you require. Ask his advice.

The only complete line of grinding wheel dressers and cutters

# Desmond

The Desmond-Stephan Mfg. Co. Urbana, Ohio

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247

January, 1959

### CRANE SPREADER BEAM WITH ROTATING C HOOK

Several unusual crane spreader beams with power driven rotating C hooks have been completed by The Cleveland Crane and Engineering Co., 6412 East 282nd St., Wickliffe, Ohio.

Each spreader beam has five hooks. The center hook may be rotated without limit in either direction by a motor drive, working through reduction gearing mounted on top of the beam. A slip device is used to prevent damage to the drive. The two hooks next to the center may be rotated 360 degrees manually. The end hooks cannot be turned. However, because they are mounted on pins, they may be rocked. All hooks, except the middle one, are rated at 20 tons capacity.



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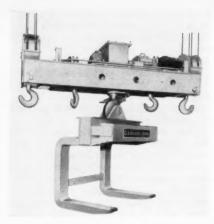
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Cleveland Crane Spreader Beam has 5 hooks

The center hook is used primarily to support a special C hook, which has a live load capacity of 30 tons. The C hook is easily attached or detached. It is counterbalanced to keep it level. The supporting hook has a safety latch which prevents the C hook from coming off accidentally.

The lifting prongs of the C hook will handle a stack of slabs with a cross section of 4 feet wide and 4 feet

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### TELESCOPIC TYPE DIVIDING HEAD ADAPTS TO ANY MILLING MACHINE

The Universal Spiral Drive Telescopic Type Dividing Head, an accessory adaptable for use on any milling machine, has been announced by the Greaves Machine Tool Co., Division of J. A. Fay and Egan Co., 2700 Eastern Ave., Cincinnati 2, Ohio. A three way adjustment, made up of the two slots in the table bracket plus the double swivel built into the quadrant,

makes possible this wide versatility of use, with mounting in the field possible no matter what brand mill is concerned.

The pendant swivel quadrant allows the gears of the dividing head to swing into position where they can reach in and contact the gears on the lead screw of any milling machine, regardless of the width of the table. The middle bracket, with its two slots, allows the dividing head to be mounted and used on the mill, regardless of the width of the coolant well at the end of the table. It also provides for leaving the quadrant and gears permanently mounted on the end of the table. The head can also be disengaged from the gear train bracket or quadrant and used as a plain dividing head. This is easily done, since the unit is telescopic and the head can be taken off by simply pulling apart.

Both 10 and 12 inch models are

available, right or left hand, with or without direct indexing. For more data circle 130 on Postpaid Card

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### SPECIAL DRILLING MACHINE

The Motch and Merry weather Machinery Co., Avey Division, Box 1264, Cincinnati 1, Ohio, recently introduced a special machine for drilling six oil retaining holes in a crankshaft.

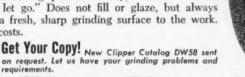
The machine consists of a No. 4 Avey HydroWay Unit, which serves as a prime mover for a six spindle drill head and bushing plate mounted on four guide bars.

Transfer of the crankshafts is accomplished through a walking-beam type mechanism, actuated by a hydraulic cylinder, indexing the crankshaft 9 inches each index. The machine has six working stations; a load and



### BONDED DIAMOND WHEELS

Clipper's new and unique ceramic-vitreous bond provides longer life with less dressing. Holds the high, sharp free-cutting particles firmly, but also "knows when to let go." Does not fill or glaze, but always presents a fresh, sharp grinding surface to the work. Reduces costs.



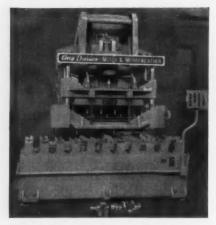




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Special Drilling Machine built by Avey

an unload station and three idle stations to provide stations for automation.

The part is clamped by spring loaded clamp pins, actuated by the bushing plate against one pin bearing at each work station.

An automatic drill checking device consists of a round bar, running the length of the work stations and carrying six individual limit switches with spring feelers, which contacts the point of each drill in the retracted position. The machine stops if any one drill is broken. Actuation of the limit switch bar is accomplished by an air cylinder.

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### MOTORIZED TABLE FOR GRINDERS

M-M Tool Manufacturing Co., Roto-Grind Division, 1128 East Third St., Dayton 2, Ohio, has developed a machine tool that it claims will double the capacity of a 6 by 18 inch surface

### HAVE YOU READ THESE TIMELY, IDEA-FULL FEATURES? Nuclear Laboratory Permits Look into the Future New applications of metals emerge as researchers cross metallurgical frontiers ...... Page 94 PACE—En Effective Cost Reduction Tool for Management Major break through in the long-time effort to reduce production costs in non-automated shops has been effectively accomplished by an industrial engineering program called PACE (Performance and Cost Evaluation) ..... How Modern Facilities Provide for Apparatus Production New plant is designed for producing products used in Attachment Helps to Produce Threads Faster German-made lathe attachment reduces time requirements to about one-tenth of that normally required Practical Pointers for Profitable Heat Treating Discussion provides helpful tips for tempering or

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Roto-Grind Unit as applied to a grinder

grinder. The motorized Roto-Table will grind the surface of a 12 inch diameter plate flat and parallel to a tolerance of 0.000050. Roto-Grind will fit on any surface grinder in either the horizontal or vertical position. The vertical position permits i.d. and o.d. grinding on a surface grinder. Roto-Grind can be used in conjunction with jig grinding for grinding large rings or offset holes. The motor can

be disengaged and operated manually. For larger work, the company has designed 15, 18, 20, 24 and 36 inch machines with variable speed motors for grinding a multitude of applications. The standard models are 6 and 11 inch diameters.

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### REMOTE-FILL LUBRICATOR DEVICE

A remote-fill device for air line lubricators has been announced by Hannifin Co., Department 166, Des Plaines, Ill. Designed for use with standard model Crown Lubricators, it is said to offer substantial savings in maintenance time by permitting quick filling of lubricator bowls, even in high and hard-to-reach places, without interferring with production. The device makes use of a specially designed but-



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### new shop equipment . . .

ton-head fitting that can be installed on either side of the lubricator body and a button-head coupler mounted on the end of a rigid extension of the oil delivery line. The two fittings are easily engaged by using the lubricator body flange as a guide. Oil is then forced from a portable hand pump through the delivery line and into the bowl. After filling, the two fittings are uncoupled by a simple upward movement of the extension. Special provision has been incorporated in order to eliminate dripping during and after disengagement.

Complete remote-fill systems are available, as well as any of the components from lubricators to hand pumps.

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### UNIVERSAL SQUARE

A new type of square has been introduced by the J. C. Busch Co., 126 East Pittsburgh Ave., Milwaukee 4, Wis. It features the versatility of both a square and a parallel.

Designed of meehanite for long lasting accuracy, the Busch Universal Square has all edges and sides hand scraped to a tolerance of 0.0001 inch in squareness and parallelism. The



Busch Universal Square is made of meehanite

Busch Universal Square adds to, and complements, the line of Milwaukee Surface Plates, Angle Plates, Box Parallels and Straightedges.

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### PISTON WEIGHT BOSS MILLING MACHINE

A high production milling machine, designed and built by the F. Jos. Lamb Co., 5663 East Nine Mile Rd., Detroit 34, Mich., mills piston weight bosses to precision tolerance at the rate of 425 pieces per hour. With transfer machine design features applied to the unit, it loads, orients, clamps, mills, clears the chips and unloads—all in a completely automatic cycle. Two different diameter pistons can be accommodated by means of interchangeable tooling.

Pistons are accepted dome down through a loading gate which permits

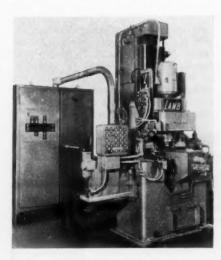


one part at a time to enter the loading mechanism. The loader moves the piston into orienting jaws which align the part with the orienting head. The orienting head rotates the part radially using opposing probes in the wrist pin holes which are offset 3/32 inch to the diameter of the piston. Circular jaws, combined with clamping fingers through the wrist pin holes, hold the piston quite firmly against the locating seat.

The oriented and clamped piston is moved through the milling, blowout and unload stations by a trap type rotary transfer mechanism which prevents station override.

The milling head is a Lamb Standard 10 h.p. Hydraulic Way Type Unit mounted in a vertical position. It rides on hardened Ohio Knife ways, which assure long wear. The milling spindle has been designed with preloaded bearings that are adjustable to take up end play. A micro adjustment

for cutter depth is also provided.



Transfer machine design features, applied to the F. Jos. Lamb Company Special Piston Weight Boss Milling Machine, provide a production rate of about 425 pistons per hour. **Great Buys from** 

# VICTOR

Extra Long, Straight Shank High Speed Drills

12"	OA,	9"	FLUTE
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١,	SIZE	PRICE	SIZE	PRICE
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11/32	5.25	43/64	12.00
3/8	5.25	11/16	12.00
13/32	6.00	45/64	13.00
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Additional features include central automatic lubrication system and special materials used in all handling mechanisms to prevent marring machined surfaces of the pistons. The entire hydraulic circuit, with the exception of the lines to the operating cylinders, is contained within several manifolds. Each valve is mounted on its own manifold block, the blocks being held together with tie rods and the porting between blocks being sealed with "O" rings. This arrangement keeps oil leakage at a minimum by eliminating external piping and, also, allows for future changes in hydraulic circuitry by rearranging the manifold blocks. All hydraulic and electric components conform to J.I.C. standards. For more data circle 135 on Postpaid Card

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# QUICK ACTING INSERT FOR CLAMPING

The addition of a quick acting insert for clamping has been announced by Northwestern Tools, Inc., 119 Hollier Ave., Dayton 3, Ohio. They can be easily installed on both new and old fixtures by simply drilling and tapping a hole at the desired location. A jam nut or a set screw can be used in order

to lock the insert in position. The inserts are available for  $\frac{1}{4}$ -20,  $\frac{5}{16}$ -18,  $\frac{3}{8}$ -16,  $\frac{1}{2}$ -13 or  $\frac{5}{8}$ -11 screws. They are hardened for long life and black penetrated to prevent rusting.

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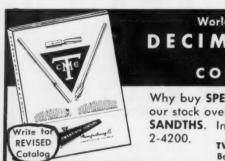
### PYRAMID TYPE ANGLE ROLL BENDER

Kling Brothers Engineering Works, 1320-32 North Kostner Ave., Chicago 51, Ill., has announced the modification and development of its Pyramid Type Angle Roll Bending Machine.

The Kling Angle and Structural Roll Bender incorporates the latest features of design and will perform more accurately with less effort for the operator and will mean extra years of

efficient service.

The Kling Pyramid Type Angle Roll Bender has been built to roll material in a horizontal or vertical plane. The vertical Pyramid Roll Bender is offered in four sizes and has been designed for bending light, medium and heavy sections of angles. It takes only a small amount of floor space. The horizontal Pyramid Roll Bender has been designed for extremely heavy sections of structural for rolling to large diameters and avoids the need for extremely high head room. The two styles have been



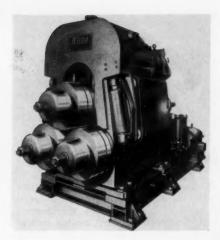
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Kling Pyramid Type Angle Roll Bender

designed with heavy duty capacity, well within the safety factor of its design, and include double frame housings with compact transmission, a tilting roll feature to prevent distortion of flat bars when rolling on edge, anti-friction bearings for the raising and lowering of both frames and positive mesh gear train for proper centering.

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### DEEP DRAW LUBRICANT

A new compound, 700 Wax-Draw, formulated for the deepest draws on the toughest metals, was recently announced by S. C. Johnson and Son, Inc., Racine, Wisconsin.

This product lubricates to temperatures of 450 degrees F. and will handle pressures up to 200,000 p.s.i. After drawing, it can be removed with simple cleaning operations, even hot water alone. A solvent bath, vapor degreaser or alkaline washer will also remove the residue quickly. Parts are

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clean and ready for further operations immediately. The lubricant will continue to adhere to metal through multiple draws and may be readily diluted with water to any desired film thickness. Application is simple, the product being applied by roller coating, spraying, dipping or simply applied by sponge or other applicator.

Coated blanks may be drawn either wet or dry and, thus, the wax coating process can be easily adapted to continuous press operations. Blanks can be fed into a roller coater, for example, and then run directly to the press operation. Or they may be precoated, dried, palletized and then delivered to the press areas or to storage spaces.

A wax film as clean as the metal itself is left by 700 Wax-Draw. The manufacturer states that it eliminates

### new shop equipment . . .

oily, messy floors and dripping press parts, making for a clean and safe shop. When spilled on clothing, it launders out easily.

One gallon of the product, undiluted, will cover as much as 2,000 square feet of metal. It will cover proportionately more when diluted, of course, and the company says dilutions of four to one produce excellent results. The product is sold in five gallon cans and 55 gallon drums.

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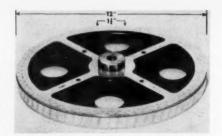
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### ONE PIECE OPTICAL POLYGONS AVAILABLE WITH FROM 3 TO 72 FACES

The Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill., is now



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A study in contrast — the largest and the smallest of Engis Optical Polygons

offering one piece optical polygons with three to 72 faces. Multi-faced mirrors of glass or steel are increasingly used with optical tooling instruments to set up and test for squareness, angles and circular spacing. The accurately spaced and calibrated faces of these reflectors have proven stability under all types of conditions involving handling, temperature change or acceleration.

The principles of this single block optical unit developed and approved by American and international standards institutions have resulted in the most accurate and permanent angle master; it is claimed to be the only unit which provides circular spacing data independent of centering. In proper testing facilities, the polygon method provides results to 0.1 second of arc

The accompanying illustration shows a ten sided polygon of 1¾ inch diameter, placed for comparison on top of a 72 sided polygon which measures 12 inches across.

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DRILL HEAD AVAILABLE IN HEAVY DUTY MODELS

Thriftmaster Products Corp., 1034 A North Plum St., Lancaster, Pa.,

January, 1959

has announced the addition of semistandard heavy duty models to its line of universal joint type adjustable drill heads.

The drill heads feature full ball bearing construction as standard. For close center distance work, these heavy duty models are available with spindle bracket assemblies having bronze radial and ball thrust bearings.

The close center assemblies are interchangeable with the ball bearing as-

semblies and are suitable for use with templates.

Two ranges of adjustment are provided with these heads with rated capacities of ½ inch drills in either cast iron or steel.

Two to six spindles can be furnished with heads having the smaller range and up to ten spindles can be furnished for the larger type of heads.

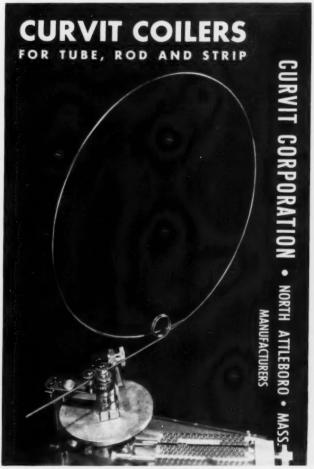
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Thriftmaster Semi-Standard Heavy Duty Drill Head features full ball bearing construction.

# TAPER CORRECTING ATTACHMENT

A taper correcting attachment, applicable to Cincinnati Filmatic Centertype Grinders up to 48 inches in length, was recently announced by The Cincinnati Milling Machine Co., Grinding Machine Division, Cincinnati 9, Ohio. This unit, known as the Gage Line, can be applied to the company's 4 to 14 inch plain grinders



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The Cincinnati Gage Line Attachment

and all sizes of its universal grinders. The Gage Line Unit is employed primarily to obtain exact alignment of the swivel table, thereby eliminating uncertain cut and try methods when grinding the work to precise accuracy of straightness.

The Cincinnati Gage Line Attachment consists of two independent gage heads, one mounted on each end of the swivel table, and an electronic control unit, mounted on the bed or some other member of the machine where it is convenient for the operator. When the swivel table is adjusted, the control unit electronically translates the signal from each gage head to a graduated meter reading direct for amount of movement and length of workpiece. The meter is selective for a high and low range, totaling 0.020 and 0.002 inch, respectively. Electrical switches on the control unit select the range of work length, magnitude of adjustment and the signal from the right or left hand gage head.

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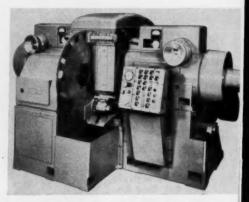
### DOUBLE HORIZONTAL SPINDLE DISC GRINDER

A double horizontal spindle disc grinder has been added to its line by Besly-Welles Corp., 108 Dearborn Ave., South Beloit, Ill. Called the DH4, the manufacturer states that this machine makes disc grinding virtually automatic.

Simplified pushbutton operation, accuracy to tenths, simple three step abrasive change, automatic dressing and sizing, centralized one-shot lubrication, improved coolant system through spindles and removed from grinder, and many other built-in dials, indicators and gages are among the features claimed for this machine.

The company's "Sealed Quill Construction" is built into this grinder. Removed from the motor and other mechanisms for highly sensitive feed control, the spindle sleeves are cradled in the heads. They are moved by the feed screw, sliding on replaceable lubricated ways with clearance adjustment provided. Precise disc and head adjustment is constantly maintained for consistent grinding accuracy.

A rugged, rigid base supports both the machine and the motor mounting. For more data circle 142 on Postpaid Card



The Besly-Welles Disc Grinding Machine

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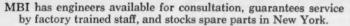
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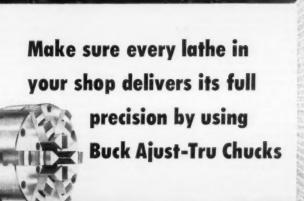
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Sometimes it pays plenty to start new habits. It does in specifying and ordering chucks.

Conventional scroll chucks at best guarantee only .003" accuracy when new — which falls off on wear.

Buck Ajust-Tru scroll chucks (2-3-and 6-jaw) guarantee dead true precision — guarantee .0005" chucking duplicate parts. The Buck adjusting principle greatly lengthens useful precision life. You get precision and many other features in Buck chucks at conventional chuck prices.

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114 SCHIPPERS LANE . KALAMAZOO, MICHIGAN

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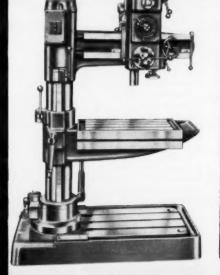
٦	Model	Col. Diam. Inches	Arm	Base Price
	L-26	71/2	26"	\$1995.
	L-21/2	8 1/2	21/2'	\$2085.
_	L-3	8 1/4	3'	\$2195.
1	M-3PE	10	3′	\$3995.
	M-4PE	12 %	4'	\$4985.
	M-5PE	14	5′	\$6295.
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18				

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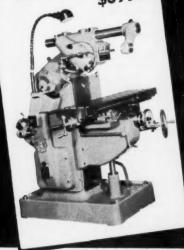
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VERTICAL HORIZONTAL
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90

71

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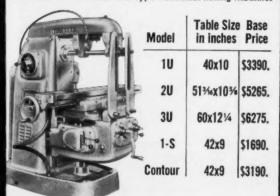
and combination
MILLING MACHINES

Model	Table Size in Inches	
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VPV-00	351/2 x85%	\$2463.
VPU-0	391/2 x91/2	\$2890.
VPU-1	51x12	\$3260.
VPV-1	51x12	\$3760.
VPF-2	61x12	\$6185.
VPU-2	61x2	\$6285.
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HOUSTON, TEXAS
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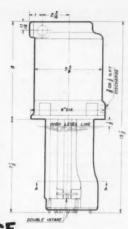
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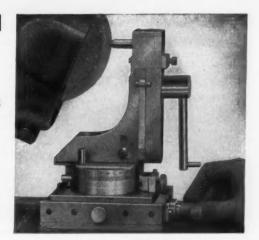
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eliminate elaborate set-ups and operations

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dress two angles tangent to a radius in one continuous motion



With the unique "Fluidmotion"
Dresser, you can dress two angles
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## 144 ABRASIVE WHEELS & POINTS

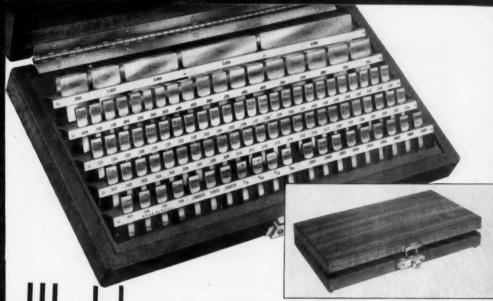


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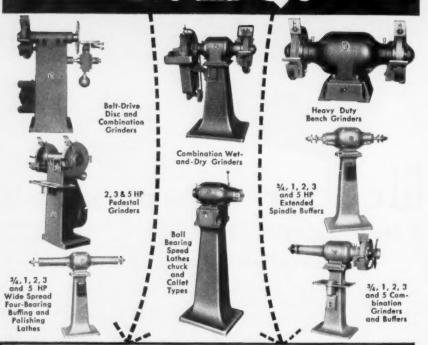
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CINCINNATI 4, OHIO

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2 2			102	127	152	177	202			177	302-	Inside	nside Front Cover	OVEF	411				511			989	611
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BUSINESS REPLY MAIL

No Postage Stamp Necessary If Mailed in the United States

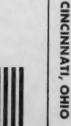
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Above \$4000 yearly savings... excellent accuracy, duplicating to less than .001". . . clean front and ease of conversion to regular or Copymatic operation are outstanding removing 15 to 30% more metal than our best (lathes) — twice that of some.

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